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ABSTRACT

These conference proceedings (from tape transcription) cover eight major presentations plus roundtable and small-group discussions and workshop sessions and two background papers from a conference attended by producers and consumers of employment projections (Federal, State and local level administrators and technicians). Topics included are Accuracy Analysis, Accuracy Assessment; Illustrative State Employment Projection Activities; The Bureau of Labor Statistics Employment Projections Program; The Role of Direct Employer Contacts Changing Occupational Requirements; The Standard Occupational Classification System: A Future Issue in Planning; A Manpower Program Administrator's Views on Employment Projections in Planning; A Vocational Educator's Views on Employment Projections on Planning; Cooperation Between Whom? Planning for What? and Why Cooperation in Planning? The conference program and list of conference participants and their addresses are provided. Background papers on "Data Sources and Issues" and "The Need and Potential for Analytically Based Occupational Classification" also are included. (LAS)

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OCCUPATIONAL EMPLOYMENT PROJECTIONS FOR PROGRAM PLANNING PURPOSES: ISSUES AND EXAMPLES

Edited By

David W. Stevens

Proceedings of a National Workshop-Conference
held at the TWA Breech Training Academy
Overland Park, Kansas, July 10 and 11, 1975.

The Human Resources Research Program
Department of Economics
College of Arts and Science
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Columbia, MO 65201

January 1976

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PREFACE

This volume contains the proceedings of a national workshop-conference held at the TWA Breech Training Academy in July 1975. The conference was sponsored by the Human Resources Research Program, Department of Economics, University of Missouri-Columbia. Such sponsorship was made possible, in part, through the auspices of a Part C grant from the Division of Research and Demonstration, Bureau of Occupational and Adult Education (BOAE), U.S. Office of Education. The facilities and arrangements were provided through the cooperation of the Employment and Training Administration--Region VII, U.S. Department of Labor; and the Bureau of Occupational and Adult Education, U.S. Office of Education, U.S. Department of Health, Education and Welfare--Region VII.

I would like to thank Jack Wilson of the BOAE national office, Thaine McCormick of the BOAE regional office, and Chuck Mooney of the Employment and Training Administration regional office, for their splendid cooperation in facilitating the planning of the conference agenda and the coordination of invitations to attendees.

I want to thank again the nineteen major speakers from eleven states and Washington, D.C., who led the one-hundred-two participants from thirty-one states and the District of Columbia.

The following people were also of substantial value in both prior behind-the-scenes and on-site roles: Byron Rawls and Les Thompson of the Region VII BOAE office; Dave Cleeton, Steve Jenisch, Alan Roskam, and Joyce Shackett from The Human Resources Research Program at the University of Missouri; and, B. W. Robinson, Frank Drake, and Glenn White from the Missouri Department of Elementary and Secondary Education.

Transcription of tapes is never an easy task. Gayla Henson and Terry Rash are responsible for the extraordinary typing which was necessary to produce these proceedings.

Since this conference was held in July 1975, another national meeting has occurred which again brought together many of the same people. The "1975 National Vocational Education Research Conference on Management Information Systems at the State Level" was sponsored by the Division of Vocational and Technical Education, Illinois Office of Education, and was held at Des Plaines, Illinois on November 5-7, 1975.

During this year of academic leave I continue to observe the incredible communications gulfs between producers and consumers of employment projections information; and even among producers, or among different types of consumers. Hopefully, this volume will serve to renew readers' awareness that there are many other people grappling with problems similar to their own, and that caution should be exercised in plunging into wholly new efforts to generate one's own data base. In this regard, your attention is called to the participant list appended to this volume, which represents a good cross-section of expertise in the topic area.

Lexington, Mass.
December 1975

David W. Stevens

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INTRODUCTION

This volume comes closer than any I have seen to date to conveying the actual state of mind of educational and manpower program administrators *vis a vis* employment projection activities and products. Other efforts have presented more comprehensive surveys of the state of the employment projection art at a specific time, but none to my knowledge has reflected the concomitant cautious optimism and despair reflected in the thoughts expressed by the registrants at this conference.

With a very few notable exceptions, it is fair to say that the leading producers and consumers of employment projections were present at this conference. At the federal level, the Bureau of Labor Statistics, the Bureau of Economic Analysis, the Economic Development Administration, the Office of Management and Budget, and the Office of Manpower-HEW, were all represented on the formal program. The Brookings Institution and The Conference Board were also represented. State administrators of both vocational education and manpower planning were part of the formal agenda. And technicians from vocational education, manpower planning, and universities also contributed. Indeed, even the local political entity was represented from the county manpower planning council perspective.

This cross-section of agency representation, geographical dispersion, and constituent mix produced highly productive dialogues which seem to occur far too infrequently given the substantial commonality of interests.

The first day began with Bill Riley's well-documented plea for recognition of the urgent need, and opportunity, to pursue a truly coordinated assault on human service needs. From his vantage point in the HEW Secretary's Office, Bill can see both the deficiencies of a failure to coordinate programmatic efforts and the opportunities to do so.

Ed O'Donnell followed with a challenge to one and all to consider the history of vocational education and the relative newness of the availability of occupational statistics. Just back from Ireland (!), Ed launched salvo after salvo at the statistical purists and the institutional defenders, the advocates of job placement as the vocational education goal, those who wear local area opportunity blinders, and those who would deny women access to diverse skill training and subsequent career

opportunities.

With the sparks still flying, Frank Drake set forth a cautiously optimistic view that employment projections are contributing to a more effective vocational education delivery system, and that their potential is great if state and local planning efforts are undertaken in an atmosphere of cooperation. While admitting the necessity of employment projection information, Frank also noted its insufficiency in meeting some planning requirements, such as changing individual competencies which are called for to perform adequately in a dynamic economy.

When Mark Sanders took the podium, it began to appear that the manpower team had been assigned an evangelist role. As a consumer of employment projection information, Mark charged producers with not trying to communicate what it is they have to offer. Willing to grant the benefit of his doubt, Mark presumes that there is something worthwhile going on, but he expressed dismay at the apparent disinterest of technicians in recognizing the administrative needs and limitations which enfold the numbers conveyed.

These four presentations provide an excellent background for Manny Weinstein's description of his work on the Standard Occupational Classification (SOC) system. Occupational classification was a recurring issue throughout the two days. Most participants were unaware of the SOC effort, and welcomed the introduction with sufficient lead time to consider how its implementation will affect them. (Readers should note, by the way, that Manny has now shifted to work on a revision of the Dictionary of Occupational Titles (DOT); an effort that will also affect all of us who are currently using some version of the Third Edition DOT--U.S. Office of Education curriculum code interface.)

Closing out the morning session was Leonard Lecht, who has been engaged in employment projection activities long enough to be generally acknowledged as an originator of the current recognition of its value in planning undertakings. Leonard described his current research at the Conference Board on the changing relationships over time between educational attainment and occupational achievement.

Three academics were then asked to give brief responses to the morning's speakers from their respective professional positions. Bob Morgan spoke from his wide experience in vocational education planning

activities. Joyce Shackett addressed the issues from her perspective as a technician currently engaged in producing employment projections. And, Alan Williams provided an international perspective from the vantage point of an industrial relations expert from New Zealand.

The afternoon session on the first day began with a tandem presentation by Dick Dempsey and Paul Braden. Dick, whose professional efforts were already well known by everyone in attendance, provided an update on the Bureau of Labor Statistics' (BLS) employment projections program. The Occupational Employment Statistics (OES) program, which at the time was active in 29 states, received particular attention.

Paul Braden followed with a careful review of the evolution of the Oklahoma Training Information System (OTIS), which he developed, and which has subsequently served as the model for the systems now operating in a number of other states. An important part of Paul's presentation was his acknowledgement of changes which have taken place in his view of the proper role of direct employer contact. It is in this context that the "tandem presentation" terminology is used, since the BLS matrix approach and direct employer contact are seen as competing, or alternative, techniques.

A five-person roundtable was convened next to provide a transition to the rest of the conference agenda, since no more single speaker sessions were scheduled. Unfortunately (shades of Watergate!) the tape of this session was of very poor quality. Indeed, most of Roger Bezdek's remarks were lost completely (which is consistent with his travel arrangements and subsequent reimbursement; just a bad experience all-around). Roger represented the most experienced modeller of manpower simulations in attendance, and reference to his recent book is offered as one way to avail yourself of his contributions. The essence of Roger's view is the need to consider alternative "if ... then" possibilities because of our inability to forecast future events very well. If the model is available, unexpected events can be plugged in to see what consequences they portend for different sectors of the economy.

Dave Breneman represented the most pessimistic view in stating his concern that we should ask, perhaps, what if we did not produce employment projections? Are the non-marginal events, such as the energy crisis, of such dominant importance that we should despair of producing

useful long-range projections which will, unfortunately, be used as forecasts?

The next reactor, Carolyn Callahan, was the only representative of a local administrative body--a County Manpower Council--and therefore added substantial insight as to the consumer's perspective at this jurisdictional level. Carolyn stressed, in particular, the inflexibility confronted by local planners when they seek assistance at the local level.

Jim Harris, who was associated with the original OTIS effort in Oklahoma, and who developed the KMUST system in Kansas, spoke from this background and from the somewhat unique circumstance of his current location--Colorado--in attempting to deal with very high in-migration flows.

The last member of the roundtable panel, Harvey Sokolow, urged the audience to recognize the origins of the BLS efforts and the expertise which already exists in local employment security offices insofar as short-run labor market imbalances are concerned. He cautioned consumers not to expect the techniques under discussion to improve upon these already existing sources of information.

The remaining five sessions were of a small-group workshop nature. Having raised a host of issues through the presentations by individual speakers, each individual was then given ample opportunity to seek out those with whom he or she disagreed, to raise alternative viewpoints, and to add one's own contribution which might facilitate others' work. Three types of sessions were held to promote this exchange of views. First, four general discussion groups were scheduled to allow people a free-wheeling opportunity to get to know each other's views. Second, sessions on "Accuracy Analysis", "Interpreting Employment Projections", and "Data Collection and Processing" were scheduled to provide some structure to the dialogue. Offered simultaneously, but two times, each person was able to attend two of the three topics. And third, concurrent sessions on illustrative employment projection systems were presented twice each. The three state systems chosen represented both differences in techniques and in administrative location. The Missouri Occupational Training Information System (MOTIS) in the State Department of Elementary and Secondary Education subcontracts with the Human Resources Research Program at the University of Missouri-Columbia for its employment projection activities. The Tennessee employment projections are accomplished

through the RCU, but there are state controls on some estimating parameters. The Utah projections are produced by the Department of Employment Security.

The sessions were lively, and the dialogue was productive. Participants left with a renewed sense of how little we know, and yet how far we have progressed in the awareness of employment projection techniques and products. Much misuse and nonuse remains, but this only heightens the sense of challenge to break down the barriers of mistrust and fear of the unknown where neither is warranted. At the same time we must work to erect new guards against continued abuse of information which is being used in faulty applications. The employment projection art can prosper only as the abuses are ferreted out and education of information consumers transpires.

The proceedings, which is "cleaned up" verbatim copy except where indicated, follows.

Thursday, 8:30 A.M., July 10, 1975

STEVENS: What I would like to do very quickly is express a few "thank yous" to some of the people who got us all here, then say a few things about the program for the day and finally make some announcements about what is happening later this afternoon and this evening. Then we will get right into the program.

The people who have been instrumental in getting us here are the following: Thaine McCormick, who is the Region VII Director of the Occupational and Adult Education Division of the U.S. Office of Education, who is here this morning from Kansas City with two people from his office--Byron Rawls, Senior Program Officer, and Les Thompson, Program Officer. They were here about a month ago for a session with people from research and analysis units in state Employment Security agencies, the Bureau of Labor Statistics, and the Manpower Administration. That

session was a logical precursor of this one.

Jack Wilson is here from the Division of Research and Demonstration of the Bureau of Occupational and Adult Education, U.S. Office of Education, Washington. Jack is our project officer on a Part C grant under which auspices this conference is a major activity.

B. W. Robinson, the Assistant Director and Commissioner of Vocational and Adult Education of the Department of Elementary and Secondary Education in Missouri is here with Frank Drake, who is on the program later this morning. Frank is Coordinator of Vocational Education in the State Department. Dr. Glenn White, who is the Research Coordinating Unit Director in the Missouri Department of Elementary and Secondary Education, is also here. They are the three people who have facilitated our work on the Missouri Occupational Training Information System (MOTIS), without which none of this particular activity would have happened.

Chuck Mooney, who is Regional Economist in Kansas City for Region VII, Manpower Administration, U.S. Department of Labor, got together with us about 6 weeks ago and worked out Manpower Administration cooperation for this conference. Indeed, we are guests of the Manpower Administration at this facility.

Finally, I must mention two people who have worked with me in the Human Resources Research Program at the University of Missouri-Columbia for several years developing the MOTIS. They are Alan Roskam, who will receive his Ph.D. in economics next month and will be leaving us to join the Cessna Corporation in Wichita; and Joyce Shackett who is our resident employment projections expert. Richard Tiller, who will also receive his Ph.D. in economics next month has already left to join the Bureau of Labor Statistics in Washington, D.C. He worked with Joyce until mid-June.

To all of the above, as well as the unsung behind-the-scenes folks, thank you, and now let's get down to the business at hand.

Our only purpose for spending these two days together is to exchange notes on the state of the art in generating employment projections which can be used for manpower program and educational planning. We are presuming that everyone here is quite knowledgeable about the basic elements of employment projections. So we are not going to be dealing in generalities. We will be dealing in specifics, and I have offended more than one person in giving such brief time for formal presentations because one

of our important goals is to get all of you talking to each other. There is ample opportunity to get involved and please take advantage of that opportunity to say what you are doing and to point out what you perceive to be strengths and weaknesses in your efforts.

Tomorrow we do not meet as a general group. We will be meeting in small groups on particular issues in the morning and will be talking about specific operating systems in the afternoon.

The first two speakers on today's program are going to talk from rather different perspectives. One is from the Office of Manpower, in the Office of the Secretary of Health, Education and Welfare. William Riley, the first speaker, is the Deputy Director of that office. Bill is one of the people who has to leave very quickly, so if you want to ask questions do it after he makes his remarks and at the coffee break. He has to get back to Washington and will be leaving at 11:00 o'clock this morning. The second speaker will be Ed O'Donnell, who has just retired as the Deputy Director of the Bureau of Labor Statistics, Region I (New England). He comes to us on very short notice just back from Ireland. After that we will have Frank Drake from the Department of Elementary and Secondary Education here in Missouri, Mark Sanders from the Governor's Manpower Planning Office in California, then a coffee break, and then I will give you more information as we go along.

So, with that, I introduce William Riley, the Deputy Director of the Office of Manpower, Office of the Secretary, HEW.

RILEY: When asked to give a talk to be entitled "Why Cooperation in Planning?" I was reminded of the perhaps apocryphal story of the Advanced Logic final exam at the University of Pennsylvania. The single question read: "WHY?" Within five minutes, two students got up and to the amazement of their classmates turned in their exams. The others wrote vigorously for the remaining two hours and fifty-five minutes filling blue book after blue book with careful reasoning. When the exams were graded, investigation uncovered the startling fact that the entire class had written C papers, save for two people. Further investigation discovered that the two early leavers had received grades of A and B. The "A"

paper answered: "Why not?"; the "B" paper: "Because." It has occurred to me that I could follow the lead of either of those two philosophers and greatly shorten my stay with you this morning. The answer that received an "A" (Why not?) is all too often the program planner's response to being asked to engage in cooperative planning. That, along with claims of - "Of course we cooperate in planning", are unfortunately responses that conceal a skepticism and distrust of cooperative planning. Cooperation is viewed by many functional specialists as the administrative generalist's palliative for all that ails a given locality or perhaps society at large. It is often viewed as a "good" insofar as it may increase resources available to the planner's particular program but as a threat if it would lead to "ripping off my funds." Cooperation has been spoken about in grandiose, rhetorical terms and has therefore been acted upon by the categorical planner in an equally rhetorical-paper exercise manner. This overabundance of rhetoric has led to some magnificent failures in execution.

The Department of Health, Education, and Welfare is committed to encouraging cooperative ventures in program planning and services deljvery. The Department's concern during the last few years has been to develop strategies whereby the whole person would be served--whereby all of an individual's needs for gaining self-sufficiency can be met. It has been widely recognized that in order to bring people in need to a state of self-sufficiency, one cannot simply deal with one aspect of their problem. A person who is unskilled, unemployed, responsible for several dependent children, and addicted to drugs will not succeed if only his or her drug problem is treated.

Unfortunately, a large part of the resources which exist to address human services needs are tied to programs that are focused on one isolated area of need--drugs, rehabilitation, medical care, training, child care, etc. The challenge at the Federal, State, and local levels lies in bringing these programs together to focus on the total needs of the person rather than on one part of the problem. Human services funds (manpower, social services) can be used as the "glue" to forge a comprehensive approach out of previously disjointed efforts.

Over the last decade, growing concern about poverty and related problems has resulted in a multiplicity of Federal grant-in-aid

legislation establishing a host of categorical programs. These programs have a single purpose focus in providing funds to address a specific human service need. Each piece of legislation often brought with it separate administrative, planning, and advisory structures at the Federal, State and/or local levels. Jurisdictional responsibilities for the programs varied, with most placed in single-purpose agencies responsible directly to the Federal Government, with little or no tie to other activities of general purpose governments.

Eligibility requirements, planning areas and services providers all differed with each program. The resulting fragmentation in programs and services made it nearly impossible for chief elected officials and general purpose governments to exert any leadership in the human resources area in directing these programs to be responsive to citizen needs.

In order to deal with the problem of the fragmented nature of the human services planning and delivery systems, the Department of Health, Education, and Welfare has carried out several developmental project efforts. Under the Services Integration Targets of Opportunity (SITO) projects, models of "integrating mechanisms" applied to different local settings were demonstrated to serve as models for other communities. The series of Partnership Grants initiated in fiscal year 1974 are also capacity building efforts. Capacity building is the Department's strategy to encourage State and local governments' capabilities to plan for and manage human resources programs. The Partnership Grants are intended to assist State and local officials in improving their capacities in seven different planning and management functions ranging from improved resource allocation processes at the State level to human service role definition at the local level. These projects are relatively small scale grants providing seed money to supplement ongoing efforts or to stimulate new systems reforms.

Another capacity building initiative which HEW has supported through proposed legislation is the Allied Services concept. Under this legislation, technical and monetary assistance would be provided to States to enable them to plan and deliver services to clients more effectively. Demonstration planning grants to States would be authorized and States would be permitted to transfer up to a fixed percentage of Federal categorical funds from non-exempt programs to related non-exempt service

programs in their plans. (NOTE: exempt programs are Title I, VI, X, XIV, XVI, XIX of Social Security Act and WIN, grants to State and local educational agencies under Title I Elementary and Secondary Education Act--all are means tested programs). Administrative and technical barriers currently associated with categorical programs could be waived by the Secretary of HEW when they impede the integration of services. Special "implementation grants" would also be available to States and localities to help cover start-up costs.

Fragmentation and duplication of services, inefficient use of resources, and a pervasive lack of coordination among the several tiers of government and private sector agencies which share responsibility for the planning and delivery of social services, continue to trouble social planners and frustrate local, State, and Federal officials responsible for making these services available. Much of the Departments' social research in recent years has been conducted in anticipation of that time when social services would be planned and developed, as well as delivered, at the community level around priorities and standards designed to meet local needs.

For the most part, the problems associated with categorical planning that I have mentioned, remain today. However, several significant reforms impacting human resources programs have occurred in recent years which have the potential to effect significant change.

The Social Services Amendments of 1974 (Title XX); the Housing and Community Development Act of 1974; and the Comprehensive Employment and Training Act of 1973 decentralize the responsibility for planning and management of social services, community development, and manpower programs to State and local governments. Each of these programs provides flexible funding to general purpose governments that should increase the capability and interest of chief elected officials to coordinate their programmatic responsibilities with programs and services delivered through the traditional deliverers of categorical program services.

Given an increase in responsibility and accountability for human resources programs at the State and local levels, decision-makers at these levels are increasingly concerned with maximizing scarce resources. Resources to meet basic human needs are viewed as inadequate and they are further constrained by inflation. As the need for social services,

and manpower services continues to escalate, funds to provide such services are in effect diminishing. State and local officials must establish linkages with other programs providing education, rehabilitation, supportive services, income support, and social services to increase their ability to deal with the needs of locally identified client groups by broadening the resources available for services to these individuals.

Under the Comprehensive Employment and Training Act, the Department of Health, Education, and Welfare has established as its policy the support by its grantee agencies of chief elected official comprehensive manpower planning. It is HEW's concern that if prime sponsors are to move toward truly comprehensive manpower planning they are going to have to take HEW's manpower and manpower-related resources, facilities, services, and planning processes into consideration. The Department, additionally, has indicated the importance of opening up the planning and decision-making processes of its categorical manpower and supportive services programs to the input of those chief elected officials responsible for developing a CETA program.

The Departments' concerns with expanding the scope of chief elected official comprehensive manpower planning ties in directly to its overall Human Resources Coordinative thrust. In support of the CETA and State and local planning, HEW has established Regional Manpower Coordination Units to provide or arrange for the provision of technical assistance regarding HEW programs to prime sponsors.

Why is HEW interested in CETA and manpower planning coordination? For the same reasons of resource and client service maximization that are of paramount importance to prime sponsors and program operators. To accurately plan for manpower programming, the manpower planner must examine all those forces and factors which affect the job economy in their geographical area. All factors that might shift the supply or demand side of the job market must be taken into consideration. In order to provide services to the broadest range of individuals in a jurisdiction, "manpower" should be viewed as covering <u>all</u> those programs and related activities which are designed to provide for more efficient and economically productive use of an area's human resources. Such programs and activities include those which:

1. provide direct employment opportunities

2. assist labor force members to cope with the entry level segment of the job market through the provision of training, education, and other supportive services

3. assist labor force members in upgrading their skills and broadening their employment opportunities

4. create or sponsor activities which lower the cost of labor market entry

5. provide opportunities for skilled training and upgrading at the professional and para-professional levels

6. and those that are structured to increase the economic productivity of actual or potential labor force members.

HEW programs falling into these categories include vocational education, adult education, vocational rehabilitation, and para-professional training programs in health, education, and social service careers. They also include a wide range of supportive service programs in child care, aging, drug and alcohol abuse, and other health services. Using the House passed appropriations figures and the Senate Committee report figures for the Education Division for fiscal year 1976, Vocational Education will receive $570.6 million dollars, Adult Education $71.5 million dollars, WIN $330 million dollars and Title XX, which can provide manpower services among others, $1.9 billion dollars. The States overmatch vocational education funds at an average 5 to 1 rate, meaning an additional $2.8 billion dollars is spent in this area. The total HEW related "manpower" funding for these formula grant programs alone nears $6.5 billion dollars. This compares to $2.3 billion appropriated for CETA, exclusive of unexpended balances and Title VI 1975 appropriated funds available for fiscal year 1976 expenditure. These rough figures indicate that CETA dollars only account for approximately 30 percent of manpower funds reaching States and localities through a variety of mechanisms. The dollar figures alone and the fact that each of these programs may serve similar target groups, provide similar services such as intake, testing, guidance, counseling, institutional training, day care support, on-the-job training, job placement, and remedial education among others, argues strongly for the development of cooperative planning mechanisms to assure the most effective and efficient use of resources and facilities.

Currently, each of the manpower programs that I have mentioned, including CETA, plans along parallel lines. Each assesses labor market

projections, target populations and services required autonomously and develops service plans independently. The CETA legislation provides specific indices to prime sponsors, particularly at the State level and to State Manpower Services Councils, that it is their responsibility to bring such parallel planning systems into a systematic and coordinated planning network.

Section 106 of the Act requires that the State prime sponsor set forth in its plan provisions for:

1. the cooperation and participation of all State agencies providing manpower and manpower-related services in the implementation of prime sponsor plans
2. an overall State plan for sharing of the resources and facilities under its direct sponsorship without unnecessary duplication
3. coordination of manpower and related services provided by the State to prime sponsor areas
4. establishment of mechanisms for information exchange between State and local governments on issues of relevance to manpower planning; and
5. promotion of the coordination of all manpower plans in the State to eliminate duplication, conflict, and overlapping services.

Acceptance and administration of these responsibilities by the State will enable local prime sponsors and the State as prime sponsor for balance of State to begin the coordination of CETA planning and service delivery with HEW funded planning and program services.

In addition to the State prime sponsor coordinative responsibilities, the State Manpower Services Councils (SMSCs) established pursuant to Section 107 are given broad coordinative responsibilities. These include:

1. reviewing all prime sponsor plans and the plans of all State agencies which provide services in prime sponsor areas and,
2. making recommendations regarding effective coordination of program efforts.

The SMSC must also monitor the availability, responsiveness and adequacy of State services and make such recommendations as would improve the effectiveness of the various services in fulfilling the purposes of CETA. The council is in a position to ensure, by planning and monitoring, that a coordinated plan of service makes needed services

available to residents, regardless of the agency supplying the service.

The language of Sections 106-107 challenges State prime sponsors and the SMSCs to establish formal arrangements for planning and coordination among balance-of-State CETA activities; the CETA activities of local prime sponsors, and operators of State agencies which are recipients of related funds. The SMSC could also establish uniform plan development and review criteria that can be applied to all related plans. In addition, the SMSC could move in the direction of providing for substantive cooperative planning arrangements between operators of all manpower programs regardless of funding source. While no statutory requirements exist to require operators of other Federal programs to participate, the language of CETA strongly encourages development of such arrangements. HEW's policy is to be as supportive as possible of SMSCs in carrying out the efforts just mentioned.

The local prime sponsor has to become a partner in the process of developing coordinated planning mechanisms. Through participation on the SMSC and through direct relationships with State agencies, the local prime sponsor should develop working relationships with counterpart officials and staff in the various agencies.

Prime sponsor manpower planners have the opportunity to begin development of a system in which all the available monies through CETA, other manpower program funding sources, and State and local sources are integrated in a plan of service to the community, even though actual control of those resources may remain spread among agencies.

The CETA offers State and local manpower planners an excellent opportunity to overcome the problems of services and target group overlap through the establishment of a broad gauged comprehensive manpower planning system. Coordination in the development, review and implementation of manpower plans among agencies can lead to better allocation and use of resources; improved services for clients; and, a better match between total client supply and targeted occupational demand. This coordination can be achieved through decision-making based on standardized data; decision-making responsive to the planning decisions of other manpower planning groups; and decision-making processes that establish formal and informal mechanisms to facilitate complete information exchange during the planning process.

A successful manpower planning process need not, and probably will not, solve all of the manpower and human resources problems in a jurisdiction. Available resources rarely permit attacking all the problems confronted by communities, but successful coordination of planning processes and plans will make significant relative change in the community by its approach to a broad spectrum of need.

The current economic situation, labor market realities, and human needs answer the question: "Why cooperation in planning?" There is no room for inefficient use of resources, duplication in services or unnecessary overlapping of target populations. Cooperation in planning will help to assure that decisions are considered with reliance on uniform data bases, common understanding of program objectives, assessment of target group needs and service needs. This will enable State and local elected officials and State grantee agencies providing manpower and supportive services to most effectively serve their client groups. The CETA provides prime sponsors and SMSCs with the challenge and the opportunity to move toward truly comprehensive manpower planning. It is up to innovative planners to accept the challenge and understand that cooperation will lead to more effective programming and client services across the board.

STEVENS: I think a good indication of the diversity of activities in which Bill's office gets involved is the fact that Bob Johnson, the Director of that office, is launching off to Indiantown Gap, Pennsylvania, for a couple of months to assist in the Vietnamese relocation program!

We now have Ed O'Donnell who, as I indicated, is recently retired as Deputy Director of the Bureau of Labor Statistics in the New England region.

O'DONNELL: Few exhortations are more loudly and persistently voiced concerning education or training for careers than that users and producers of occupational statistics come together to "plan and cooperate." What

form this effort ought to assume is seldom detailed. And despite encouraging progress toward development of a whole new body of statistics of occupational demand there remains about as much disagreement as harmony concerning the quality, appropriateness, and method of application of these data. Quantity of statistics has become less vital a question than whether or not those which are produced are in fact those which should be and, if so, how best can they be employed in the deliberations of school planners, advisory groups come newly into existence in obedience to the mandates of legislation, and guidance personnel.

There is not yet agreement between groups of consumers concerning what statistics they really need. This, of course, puts the producing agencies in the chancy position of guessing what material they should produce. And the guesses are not always very close to the mark. Some of the loudest demands are for data which often appear, upon close examination, to be used merely to satisfy (or appease) federal reporting requirements themselves sometimes of questionable wisdom. Discussion is lively concerning the degree of local geographic coverage necessary as well as the refinement of occupational detail required to obtain approval of proposed instructional programs. And always present is the need to demonstrate for jurisdictions sometimes unrealistically small the existence of immediate employment prospects for graduates.

The debate is enlivened by argument between statistics-producing agencies and even within these expert bodies over the technical paths best followed. Still another flourish of controversy is added by a powerful and articulate segment of the educational profession by no means satisfied that occupational and manpower data should play any sizeable part in shaping curricula. Sooner or later these problems of coordination of concept and procedure will be resolved and relatively orderly and systematic methods of application will find adoption. The stakes are too great to admit any other conclusion. Actually the confusions which presently exist are largely excusable on the ground of inexperience with subject matter compounded by the enormous geographical and socio-economic complexity of the problem. Bit by bit they will yield to solution.

The Problem is New

After all, employment and unemployment statistics--plentiful though

they may seem today--are of relatively recent vintage. Only a few decades ago the decennial census was depended upon for figures of employment and joblessness. But the need to measure success or failure of recovery measures of the New Deal during the 1930's focused attention upon and inspired research into the measurement of industrial, governmental and commercial employment at more frequent intervals. Over time, in response to this and other needs an impressive body of industrial statistics evolved. But not until the advent of such legislation as the Area Rehabilitation Act, the Manpower Development and Training Act in 1962, the Vocational Education Act of 1963 with subsequent amendments and more recently CETA--all placing heavy responsibilities for job training--did the demand for occupational employment truly burgeon.

To meet the purpose of these pieces of legislation it became necessary to know not only how many were employed in steel mills or electronics plants or in banks or local government, it became essential to decide with some precision how many carpenters or bakers or beauticians or auto mechanics were likely to become employed. Else how could educational and training needs be measured or courses planned?

Now all of this occupational statistics furor has happened in a period of time roughly co-terminous with the Space Program. For reasons which need not be dwelt upon the occupational information program seems now about in the position of the Space Program's Project Mercury years ago. Impressive it undoubtedly is as an achievement but still as far behind what actually is needed as Mercury was behind Project Apollo! But it is a very good start and the achievements of pioneers in the field must rate as truly constructive accomplishments in statistics.

Controversy Is Rife

There is nothing wrong with the entertainment of differences of opinion concerning the place and nature of occupational statistics, but for the sake of the students and educational planners who must, after all, comply with administrative regulations of federal agencies the debate earlier alluded to between researchers in the kindred disciplines of education and labor market economics must not be allowed to deteriorate into a mere feud between peevish adversary groups.

Occupational Statistics Have A Place In Educational Planning

Whether or not these statistics have a proper place in educational

planning is a case in point. Long ago the votes were cast by educators themselves in favor of linkage of these efforts to the world of work. Evidence of this abounds. According to the Digest of Educational Statistics almost exactly half of the bachelor degrees conferred in 1973 were directly related to labor market preparation--accounting, teaching, engineering, finance, management to name a few. Of the remainder there can be small doubt that as bachelor degrees they represented steps toward admission to law or medical school or other career based fields of graduate study. The same publication showed that, of all college graduates in the American population in 1967 the degree fields were:

Business and Commerce	18.4
Education	15.4
Engineering	15.7
Health Professions	7.5
Law	6.4
Economics	2.7
Biological Science	4.5
Humanities	6.0
Physical Science	8.4
Religion	2.2
Social Science	8.0
Other	4.8

Counting the first six disciplines as directly career preparatory almost exactly two thirds of American college graduates were in degree fields closely related to labor markets. How then, can Academia plead disinterest in preparation for the world of work without at the same tim disowning the bulk of its own past accomplishment?

Other Experts Entertain Misgivings

Not only educators of certain disciplines have expressed doubt concerning the place and usefulness of occupational statistics--so have many influential statistical purists in high places within governmental agencies and universities.

These purists fear the technical hurdles and shy away from embroilment in the frightening task of developing the concepts necessary to bring about projections of occupational employment especially for small geographic areas or in what they fear will prove excessively minute industrial or occupational detail. They dread "misuse" of their data and hold out for professionally meticulous standards of precision comparable to those for publication in scholarly journals. Yet a little reflection should remind them that any major existing statistical series has aspects

which are open to question. The problem of accounting for quality change in articles included in the consumer prices index, for example, or the troublesome undercount of black males of certain age groups in the census. How universally acceptable are our current definitions of employment or unemployment? Is the classification of the citizenry into racial and ethnic groupings totally satisfactory to all users of the government's statistics for compliance purposes? For example, how does one classify as a "black" or "Negro"? Does the existence of difficulties argue against the continuance of these statistics? If the answer is no, why then, should occupational data be more harshly treated?

Scholarly precision is a laudable goal toward which these or any other statistics may aspire. But, given the realities they confront, planners need now useful, reasonable approximations for their immediate purposes. Experts, do not worry excessively over "misuse" of your data! Which of your existing series is never misused?

Be assured that no one interested in developing useful occupational statistics seeks to denigrate statistical precision any more than to debase educational or academic purity by an admixture of labor market influence into planning processes. After all, statistical theory is based upon the inevitability of some degree of uncertainty. Practical usefulness and statistical significance are not exactly the same thing. And the planner's problem is distinctly in the realm of the practical--what to build, what to teach, where and when to seek for particular kinds of work or specially qualified workers.

Demographic Trends Are Vital To Planning

Planners must remember that common to the related fields of education and labor force analysis is concern with population trends. Quite recently these have moved to the fore and currently receive their full measure of discussion. But this concern is long overdue and the hour for action is late--very late for certain purposes! No better testimony exists of the virtue and need for consultation and cooperation between educators and labor force analysts than the present spate of articles about existing and impending shortages of students. This developing lack of potential students and young workers did not come about overnight! The baby boom reached the height of its plateau in 1957, almost twenty years ago! Since 1961 the annual number of live births has

trended almost uninterruptedly downward and last year's 3,166,000 new babies was a decrease of 1,100,000 or nearly 25 percent from the crest of the boom. Yet during the period we have instituted and remained faithful to policies which might constructively have been altered in light of the readily accessible demographic record of live births. As just one example design of buildings erected for education might well have given consideration to multi-purpose uses stemming from the inevitable decline in the numbers of lower grade and secondary students and of college students of conventional ages. Equally inevitable is a dramatic increase in young adults of ages 25 through 35 which is the prime target population for adult education and special vocational improvement courses. What place in plans has this tremendous promise for adult and continuing education attained in vocational or other considerations for the future? While high school and junior college age groups are dwindling in size by 26 percent young adults, interested in career improvement and attuned to programs of study will be increasing in number by a full 35 percent! What moves are planned to capitalize upon this opportunity? Should vocational educational emphasis be placed as firmly upon the shrinking teenage population as in the past? Why not more attention to upgrading the young adult work force? Remember, vocational programs for young people will be in fierce contention with academic programs for their share of students. These academic programs will be fighting for survival. And they can marshal great influence and prestige. Do not fail to exploit this newer and growing market offered by the mushrooming numbers of young adults.

The Labor Market Omniscience Fallacy

There is much current criticism of education's faltering effectiveness because new graduates have trouble finding suitable employment related to their education or training. This, at the moment is less a problem for vocational education than for the humanities or social and behavioral sciences. But such doubts are for all of education an infection, and like any infection they can spread in the absence of protective action. The idea that because a student does not find immediate employment upon graduation from a two or four year program that program is a failure is preposterous! There is nothing in the organization of a school or college which confers knowledge in September of a given year--

say 1975--what the demands for particular skills will be precisely in June 1977 or June 1979. The history of the U.S. labor market is of long term rise but with a never-ceasing succession of ups and downs around this rising trend.

Whether a particular class will graduate into an "up" or a "down" bump of the cycle is beyond the ken of any school. There is no way of making an honest guarantee of immediate placement upon graduation from a particular curriculum. No school should accept any such obligation. The only obligation which the school should accept is to make the student competitive so that when the upward phase of the cycle sets in he will be able to make his move upon equal or superior footing. The school can only control its curriculum--it cannot control the ups and downs of the business or production cycle!

Educators must not supinely accept criticism of their programs on this score. They should fight for recognition both by agencies powerful in planning and by parents that the only honest guarantee is to make the graduate competitive--they cannot and will never be in position honestly to offer guarantees of immediate placement. The world just doesn't run that way!

Parochialism In Planning--A Problem For Vocational Educators

To what degree should local conditions shape the planning of vocational curricula? This is a hard question. History shows with painful clarity that the economies of some states and areas simply cannot support a healthy and sophisticated labor force--dynamism just is not there. In New England examples come readily to hand with comparisons of certain old textile or shoe centers with areas strong in the electronics, computer or other hard goods industries. Similar contrasts exist in other sections of the nation. So--how to plan the curriculum with regard to the realities of economic geography? What's to be done if the local economy cannot support a decent program? The United States is about 3000 miles wide and more or less as deep. Why should vocational skills be less transportable than academic ones? This implies, of course, necessity for good national labor market information for the student. What of obligations to improve the local labor force as a weapon in industrial development? In some measure such obligation exists. But vocational education is, after all, education and should consider first of all the

student's interest, not the area's. What is planned is an educational venture, not a placement service--the boys and girls' welfare must be the prime consideration. Here is a wonderful chance to weave together the opportunity presented by the expanding adult education population and the necessity of upgrading the local labor force. This, if one goes back far enough was the original intent of vocational education. Serve local interests in the planning sense through this population rather than by calling upon youth to gamble that a certain vocational curriculum may be productive if only some new factories can be induced to move in! What if they do not? Let the student profit from the countless opportunities in the nation from coast to coast not just between the city or county lines. There are no limitations clamped upon the mobility of his academic counterpart--why then, should there be strictures upon his?

Women's Place In Labor Force Preparation

Finally, and deserving of a foremost place in any proper scheme of planning priorities is the need to improve the competitive position of women in the work place. That the ladies have provided the major quantitative gains within the labor force is by now axiomatic. Between 1947 and 1974 over 17,800,000 new women workers came upon the scene compared with 12,200,000 males. Women's rate of participation in paid work was about 31 percent of their number in 1947 and about 45 percent today. The male rate declined from 87 percent to about 78. The labor force as a whole has shifted from 20 percent female in 1917 to 28 percent in 1947 and about 40 percent today!

But these quantitative gains have not been matched by corresponding qualitative improvement in women's job opportunities. Old stereotypes persist in educational and training programs and much attractive vocational education is still difficult of access if not entirely closed to girls. What defense exists for this injustice and how long will inequity endure? Will vocational planners move voluntarily toward solutions deliberately and rationally? Or will they await furious onslaughts from woman's liberation groups demanding solutions "now" thus condemning vocational education to a plethora of ill considered and only half effective adjustments and crash programs in frantic response to aroused feminine fury?

The forthcoming decrease in numbers of teen-aged girls will be as

pronounced as the drop in potential students among boys. So will the increase in the female population aged 25 through 35, with its implications for increased training and skill updating among new women workers and labor force re-entrants. Here is, at the same time, a heavy threat with which vocational planners must deal--severe decline in size of the pool of conventional school ages--and a bright promise held out to them--a great increase in the number of ambitious young women seeking to improve their labor force skills. Surely planning and cooperation are called for! The opportunity, for those who will grasp it, is unparalleled!

In Summary, Hope and Confidence

All in all the outlook for occupational data, its nature, quality and application is bright. The need seems obvious and among a strong element of the responsible population determination is strong. The objections to employment of such statistics are respectable and powerfully stated by good and sincere people but they can be countered by better arguments from people of equal sincerity and devotion to excellence. There is no compelling evidence diminishing education's importance to America and almost never has vocational education stood in better regard within the totality of educational forms. It faces a lengthy period of expansion of a major market and will be prodded to higher efforts by aroused womanhood. Planning and cooperation--labor force economists, academic educators, vocational people, industrial developers, parents, students, guidance people,--all have parts to play. Let us proceed to produce the necessary tools and during the process of their production let us communicate freely as concerned professionals and good citizens.

STEVENS: Thank you Ed. Okay, now we move to Dr. Frank Drake, who is the Coordinator of Vocational Education for the Department of Elementary and Secondary Education in the state of Missouri, who will be talking about a vocational educator's views on projections and planning. Frank will be followed by Mark Sanders from the California State Planning Office.

DRAKE: In dealing with the topic assigned me today, my remarks as a state-level planner will be restricted to experiences here in Missouri when relating the need for employment projections to the vocational planning process. Vocational educators will quickly call attention to the fact that in developing a delivery system of vocational education, there are many vital concerns, only one of which centers on employment projections. The other concerns include such things as the identification of people's needs, the target populations which are to be served, appropriate program mixes, the strategies which we might want to employ for program development, concerns over facilities, the availability of trainees to enter a program, concerns over personnel, staff development problems, and a host of other things, not the least of which would be money considerations to support the delivery system. Vocational educators strive for a maximum impact with legislative bodies to gain dollar support for the statewide programs of vocational education.

Vocational planners, for years, have been pleading for good, usable employment projection data. In our view, the necessity for accurate and valid projections in the employment sector are important, but there is an important relationship here that exists between accurate projections and the degree of sophistication that planners bring to the total planning process. We're really saying that it doesn't make a lot of difference if we have the most excellent of employment projections and have poor planners who do not utilize the available data. On the other hand, we'd have a similar kind of problem if we had a very excellent planning group and a poor data base from which to operate. Not too many years ago, we found ourselves in a rather difficult position because we lacked information, specific information, on labor market data. Only as far back as five or six years ago, our friends in the Regional HEW Office would tell us that we needed more detailed information about labor market demand information in Missouri. So we found ourselves reading magazines, trade journals, and generally scrounging about attempting to depict specific occupational demand. Even Reader's Digest served as a source for some of our occupational projections. We manufactured mystical formulas to be applied to national data in an attempt to depict a Missouri need. We were, in short, very desperate for information. Because of these problems, we committed ourselves to the development of a

management information system. We were willing to invest a considerable amount of money in the system to support our statewide vocational program. In Missouri, our management information system is called MOTIS, the acronym for the Missouri Occupational Training Information System. Just in passing, let me note that our system has several components. The first component yields labor demand information which we regard as vital in our planning process. The first component also gives us vocational education trainee supply information; data is collected from both private and public schools over the state. A second component supplies information on student accounting and job placement which is of considerable importance to us. The resources information component attempts to merge into the total delivery system such things as the availability of facilities, the availability of teaching personnel to staff the programs, and the like.

We find that today, the employment projections generated from our MOTIS system are exceedingly important to us because they do form a basis for vocational program approval and program development. In our state, local school districts send applications to our office to conduct programs. The proposed program must be compatible with employment projections or the application is denied. The jobs, in short, need to be out there if we're going to develop programs. We think this approach assists in bringing about a reconciliation of supply and demand factors in the labor force. Projections are also important to us from the standpoint of delivering trained people in an appropriate time frame into a given labor market area. The projections have significance in terms of the size of training programs and of the scope of training. They are, of course, significant in terms of geographic location. Now in our state, the use of employment projections must be viewed in the light of certain kinds of relationships that exist between the state educational agency and local school districts. The state does not have absolute control. In Missouri, our delivery system is composed of comprehensive high schools, area vocational schools, and community colleges, all of which have local boards of education, with each exercising a reasonably high degree of local autonomy. This requires the state office personnel to exert leadership and a certain amount of persuasiveness in establishing the direction that the vocational delivery system should go.

People in state-level positions probably would admit that there are certain pry bars that can be used to bring about certain desired results, but it's not an absolute control. It is a relationship of cooperation and of working together.

We think it is extremely important that both local and state educational agencies use a common data base of employment projections for planning purposes. We're convinced that state and local planners really do not plan for anything other than success. We don't plan for failure, but sometimes we may not utilize or may not have available the best kind of planning information on which our decisions must be made. For a number of years, we have requested specific information, but have received data classified by the standard industrial classification. That lack of information can hamper the planning process and can also restrict the accountability measures that an agency may wish to follow. A common yardstick in vocational education relates to the business of follow-up. How many people did you place in the labor market for which training had been given? Obviously, there is a relationship in the vocational delivery system between input factors such as employment projections and the output factors relating to job placement.

We think employment projections are important, but we also need information about the competency levels within an occupation. At that point, we're not sure whether our MOTIS program can accept this responsibility. We need to be able to pick up technological change at the earliest possible date. Only a few years ago, electronics programs in our state were bombarded by salesmen peddling breadboard circuits and equipment which utilized vacuum tubes. All of this was happening at the same time the industry was converting very rapidly over to transistors. Technological change was occuring and despite advisory committees in local schools, we weren't picking this up. You can still visit school districts and find lots of vacuum tube training equipment that's gathering dust. Hopefully, it's been abandoned by now. Technological changes occurred in such training areas as welding where the introduction of inert gases has changed the instructional process and equipment. These are examples of the kinds of things that we need advanced information about, because it does have significance in the instructional process. We need to have information relating to the kinds of barriers

within an occupation because these represent an area of possible rapid change within an occupation. I'm referring to licensing agencies such as the State Board of Nursing. Almost overnight, they can do something to us that presents either quite a challenge or quite a problem. Local building codes represent another area where rapid change could occur overnight. The instructional process for training plumbers would necessarily change as codes are revised. Changes in the use of materials in the plumbing industry become significant to the instructional process when you think of changing from cast iron pipe to copper pipe or maybe even to plastic pipe in some cases. When change occurs, the instructional process in our schools must be responsive to those changes. The controls and the restrictions imposed by labor unions become very significant to the instructional process. I'm really pointing out that while employment projections are extremely important to us, there are other equally important information bits about an occupation that are important to us in the planning process.

There is no question but what we have better employment projection information today than we've ever had before. We hope that in Missouri, vocational education planners will be able to utilize these data to improve our delivery system of vocational education.

STEVENS: Okay, we will now move to Mark Sanders who is the Director of the Office of Manpower Planning in the state of California.

SANDERS: [unedited] I represent the other half of this morning's sandwich. You had the first slice of bread with Bill Riley. You had the meat with Ed O'Donnell and Frank Drake. I'm the other piece of bread. It's a misnomer that we're in manpower planning. We don't do much planning. We do administer a program. I haven't discovered a lot of planning in California or in other places that I've looked. I don't know anything about occupational projections. Ed O'Donnell was absolutely correct when he said that the consumers don't know what the

producers are doing. And I sure think that you producers don't know what we want, and if you do know, you don't give it to us. So, I really had mixed emotions about coming. [joke deleted] I picked up on some of the morning comments that the users of the data that's being generated for occupational projections aren't particularly sophisticated. It's true, we're not. You are a sophisticated audience, and part of your job is to educate us who are supposed to be in the planning business on the uses of these data. But you're going to have to sell them on their worth, and not as Ed O'Donnell was alluding to, that you are seeking perfection and that you can't give it to us therefore you don't give it to us. Projections are devoted to the SMSA's for the basic part. It's hard to get anything anymore at the local level. Frank Drake mentioned that we need more local data. It's a fact, we deal in localities. The CETA Act itself put things down in the political jurisdictions. That's our lives. We think in political boundaries. We do not think in broad labor market terms. You have to think in political terms where we are hiring you to work in our prime sponsorship areas. You think in those terms, but the state people and the federal people persist in their attitudes that we can get what we need from these broad based SMSA's. In fact, in Washington they don't know that our SMSA in California is often bigger than four or five of the states that they are living in, so the data are not very good, where we have a half-dozen prime sponsors. I started to read some junk on manpower projections because I was concerned and wanted to say something that made it appear that I knew what I was talking about. I gave it up after I read something that says they assist in individual career choice, job counseling, development of educational training programs, and they're alleged to aid in attaining the objectives of full-employment, the elimination of labor bottlenecks, etc. I don't know exactly how these work. Frank mentioned that they use occupational projections to approve and start training courses. I know that happens. I see that often. But I don't see it often used to stop training courses. I see Ed O'Donnell saying that you have to fight for courses you think are correct if you're in the education business. That's the truth. They're fighting to keep teachers alive because of the diminishing enrollment. They're catering--pandering if you please--to the interests of the student, often an uninformed student at the high

school level, often a not much better informed student at the junior college level, and often a less informed student at the university level, that at least they have some other facades by the time they're in a four-year program. But there is that pandering, and it is producing people in mass numbers who are not ever going to be competitive in what they really want to compete in. I believe in education. I think it's very important. I believe in occupational projections. I think they're very important. I'd like to know how to use them. I'd like the people who are being educated to know how they're going to use what they're using. We see in areas where we have occupational projections in California--we have something called an industry-occupation matrix which does tie things to entry levels and intermediate levels and upper levels of occupations across a broad line, but even so in those areas where people are very sophisticated, where they have a tight little group going, where they have all stroked each other for three or four years, where they really have a good thing going; even in that district where they know more than in most districts about both the supply side and the demand side, they still lack supply side information. The school district autonomy is certainly unique to Missouri. We have it in California too. School district A will train its people on the premise that it really doesn't matter what school districts B, C and D really are doing, or the private schools, and we will flood the market with these people who can compete but who are focused on some specific occupational objective and they don't get the jobs. So, we aren't even counseling people because we don't presume to tell anyone what they should or should not do. I don't suggest that you do that; that would be terrible. So, teach us how to use these projections. I think if nobody were to pay attention to the projections it would be easier for you to generate them, and we wouldn't have the self-fulfilling prophecies which come from using these projections. And while this may not be an argument for junking the whole system, we want to do what we can to make your job easier. And if you don't help us use these things, I think we will help you make them easier. And in closing, people say its relatively inexpensive. Ed O'Donnell says we haven't supported this effort. Well, we haven't, but we poured $400,000 in it in California this year and we got a piece of crud. I think that's not relatively inexpensive. You're going to have

to sell us on what you're doing, and teach us how to use it.

STEVENS: I think that it's fair to say that those of you who are technicians--a number of you here--have more than an adequate challenge for the next day and one-half. And those of you who have ignored the second of tomorrow morning's sessions, which is called "Interpretation," may want to reconsider the importance of interpretation. We were aware in planning the sessions that data collection and data processing issues were of paramount importance. We have a particular interest in accuracy analysis. You have heard from a variety of sources this morning that you can have a tremendous amount of information that is virtually worthless if no one makes the necessary effort to assure user understanding of its strengths and weaknesses, and intended purpose(s).

(COFFEE BREAK)

Thursday, 10:30 a.m., July 10, 1975

STEVENS: Again, I've given our next two speakers extraordinarily brief time slots, and they really have a lot of things to say. We are now getting to very specific issues about occupational projections and planning. Our next speaker is Manny Weinstein, who is familiar to many of you, from the Bureau of Labor Statistics and also now from the Executive Office of Management and Budget. Manny is a technical advisor to the Standard Occupational Classification Project. If you have not heard about the Standard Occupational Classification System, you will be glad you're here because you will be hearing a lot about it in the future and it will impact on your activities. So, I present Manny Weinstein.

WEINSTEIN: Good morning. As has been intimated by previous speakers, there's been a considerable interest in occupational data because of the need by many people such as social scientists, educators, guidance

counselors, manpower planners, and business and labor officials to be informed about occupational characteristics and trends. However, there is a difficulty in that there are many classification systems and the differences among them have been a hindrance to the effective comparison and analysis of occupational data collected under the various systems. The current interest has only served to emphasize a long-existing need for a standardized occupational nomenclature and coding system.

The Office of Management and Budget in August 1965, circulated a letter amongst various government agencies, asking them if they would be interested in establishing a standard occupational classification and 28 agencies replied that they would. In December 1966, the project was started, and is still active. The idea of a standard occupational classification system is not new. The historical point of reference that would be most pertinent to what we are concerned with is the publication of the Convertibility List of Occupations published by the Bureau of the Budget which preceded the OMB. This list was called a Standard Occupational Classification by Alba Edwards. And he does mention it in a 1940 publication.[1] This List was not intended to be a classification scheme. Rather, it was a tool by which differing classification schemes could be reconciled, and by which occupation statistics of different agencies could be compared. The committee that published the List felt that it was impractical to develop a classification scheme which could be used with data derived from a variety of sources, and intended for various purposes. At that time the Census and the Employment Security occupational structures were the ones that were related to the List. Today, we have essentially the same situation. We're trying to reconcile the Census occupational classification system and the system that is in the Dictionary of Occupational Titles. As you can surmise, the purposes of these two systems differ considerably. The census system is primarily for census purposes, and the DOT system is mainly intended for job referral and counseling purposes and other employment service operating

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[1] Edwards, Alba M. Comparative Occupation Statistics for the United States, 1870 to 1940, 16th Census-1940 Population. U.S. Department of Commerce, Bureau of the Census, Washington: U.S. Government Printing Office, 1943, p. 4.

purposes. Other agencies have created classification systems which are either adaptations of these or are entirely new, e.g., the National Science Foundation, the U.S. Civil Service Commission, and the Department of Defense. You can readily see, therefore, that we have quite a job on our hands.

Recently, the Bureau of Labor Statistics issued a revised edition of a publication that illustrates the difficulties of attempting to match existing classification systems.[2] In it, the Census codes, the BLS matrix titles and codes, the vocational education program codes and titles, and the DOT codes and titles are compared. If you read it, you will find many footnotes indicating a tremendous number of difficulties and gaps. The publication is available through the regional offices or from the Government Printing Office in Washington. Manpower and educational legislation which has been enacted in recent years, and which deals with specific problems, has forced the Labor Department, the Department of Health, Education and Welfare, and other agencies to attempt to obtain data about the labor force, employment, income, and other data that are needed to appraise the occupational structure and requirements of the work force. This has emphasized further the need for a common terminology and a standard coding system for occupations. The current work on the development of a Standard Occupational Classification (SOC), we hope will produce a reference tool used for a new system of occupational statistics, both in and out of government. I'd like to point out that the SOC is a significant advance in occupational classification for this country. It will furnish a coding system and a nomenclature suitable for use by all agencies for identifying, classifying, and codifying occupations. The system is such that we hope it will be able to be adjusted to the specific needs of agencies. In other words, the users should be able to contract or expand the structure to suit their specific purposes.

One of the fundamental concerns that we have had, is to provide a common base so that there would be a continuity of statistical data

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[2]U.S. Department of Labor, Tomorrow's Manpower Needs: Matching Occupational Classifications to Vocational Education Program Codes, Supplement 3, (revised 1975), Washington: U.S. Government Printing Office.

gathered under other systems. I would like to stress the fact that the SOC will not replace the Census or DOT systems when it is issued. We hope, however, that some adjustments will be made in those systems to make them more compatible with it; and personally, I hope that someday the United States will have a single multi-purpose occupational classification system similar to those in other countries. I'd like to point out also that there is a classification system which has been a valuable source, and it is the International Standard Classification of Occupations (ISCO). This was issued by the International Labor Office, and I am proud to have been a member of the team that turned out the first edition. It has been gratifying to see the impact it has had on world statistics in the area of occupations. The object of this system was to facilitate international occupational information by making occupational data more comparable among nations. We hope that when we establish our system we will better be able to compare our data with those in other countries. The interesting thing is that ISCO has been a basis for the multi-purpose kind of classification that I've previously mentioned. Many countries now have a single system which they use for both census purposes and employment service purposes.

The SOC, as we see it, is a grouping of occupations into homogeneous and related categories and sub-categories based on similarity of work performed. Included in the classification process is a consideration of education and training; the duties performed by the worker; machines, tools, equipment and work aids used; materials or subject matter used; the product made or the service performed; and the industry. I want to emphasize that this structure focuses on occupations and the people who perform them, rather than on the industry and products or services. In other words, we want it to be a people-oriented structure. And the emphasis is on transferability of competencies from industry to industry, and product to product, or service to service.

The SOC will be a four-level system, i.e., divisions, major, minor, and unit groups. By looking at one of the hand-outs you have which deals with the sales area, you can get an idea of the whole structure.

Division: J. SALES OCCUPATIONS

This division includes occupations concerned with soliciting orders for goods and services, selling commodities and services in stores and similar establishments, purchasing commodities and property for resale, and with conducting wholesale and retail businesses on own or owners' behalf or in partnership. Managing supervisors of individual chain stores and of departments in stores are included in this division. Managers who direct activities of sales departments of large organizations are in Minor Group 125.

Major Group: 41 SALES OCCUPATIONS, COMMODITIES

This major group includes occupations concerned with conducting wholesale and retail businesses which sell commodities on own or owners' behalf or in partnership; supervising and coordinating activities of workers directly and indirectly engaged in selling commodities; selling machinery and equipment and providing technical information about their composition, utilization, and maintenance; selling commodities on a wholesale basis usually in a specific geographic area; and selling and demonstrating commodities in wholesale and retail establishments and homes, on the street, and from door to door. Sales managers are classified in Minor Group 125.

Minor Group: 411 SUPERVISORS, SALES OCCUPATIONS, COMMODITIES

This minor group includes occupations concerned with conducting wholesale or retail businesses on own or owners' behalf or in partnership; or supervising and coordinating the activities of workers who sell commodities.

Unit Group: 4111 WHOLESALE AND RETAIL TRADE SUPERVISORS

This unit group includes occupations concerned with planning, organizing, directing, and controlling operations of a wholesale or retail trade establishment or department of such an establishment concerned with buying and reselling goods to the public; buying and warehousing merchandise and selling it to retail, industrial, commercial, and institutional consumers; and supervising and coordinating activities of sales personnel.

		DOT Code	Training time[1]
Manager, store	Retail trade	185168054	47
Wholesaler	Wholesale trade	185168078	58
Converter	Wholesale trade	185168018	46
Importer-exporter	Retail & wholesale trade	185168022	57
Manager, parts	Retail & wholesale trade	185168050	47
Manager, sales	Cleaning, dyeing, & pressing	187168130	47
Route supervisor	Any industry	292138010	46
Route worker	Printing & publishing	292168010	45
Subscription crew leader	Retail trade	293258014	35
Department head, supermarket	Retail trade	299138014	47
Manager, department	Retail trade	299138022	47
District circulator	Printing & publishing	299368014	35

[1] First digit represents levels of general educational development. Second digit represents levels of specific vocational preparation. For a complete explanation, see DOT.

As you can see, we have a definition at each level. The division is coded with a letter. The major group has two digits. The three-digit group is the minor group. And the unit group has four digits. We hope that the level of finest detail will be the unit level. However, we do expect that there will be instances where the minor group will be the finest level of detail. The definitions at this level are related to the Dictionary of Occupational Titles, the Census classification, and to any other titles that we can obtain from other sources. So, if you want to know about wholesale and retail trade supervisors and about some specific occupations in this group you can get this information by referring to the definitions in the DOT.

The classification system also has 21 tentative Divisions.

TENTATIVE STANDARD OCCUPATIONAL CLASSIFICATION DIVISIONS

A. Executive, Administrative, and Managerial Occupations (11-14)
B. Engineers and Architects (16)
C. Natural Scientists and Mathematicians (18)
D. Social Scientists, Social Workers, Clergy, and Lawyers (22)
E. Teachers, Librarians, and Counselors (25)
F. Independent Health Practitioners (28)
G. Writers, Artists, Athletes, and Entertainers (31)
H. Health Technicians and Technologists (34)
I. Technicians and Technologists, Except Health (37)
J. Sales Occupations (41)
K. Clerical Occupations (44-45)
L. Service Occupations (51-53)
M. Agricultural and Related Occupations (55-57)
N. Construction and Extractive Occupations (61-62)
P. Transportation and Material Moving Occupations (64)
Q. Mechanics and Repairers (67)
R. Precision Working Occupations (68)
S. Production Working Occupations (71-79)
X. Elemental Occupations (laborers) (81)
Y. Military Occupations (91)
Z. Miscellaneous Occupations (99)

This is one of the innovations of the SOC. It has a greater number of divisions than usually appear in any of the United States occupational classification systems. For example, the Census system has 12 major groups and the DOT has 9 (see comparative listing at end of paper). However, there's a feeling among us who are working on this project, that divisions or major groups with titles like Professional, Managerial, and Technical, pose problems for those who use data that are aggregated under such rubrics. It really becomes meaningless when you think that Professional, Managerial, and Technical includes a conglomeration of occupations like baseball player, physician, ballet dancer, strip-tease artist and other occupations. You don't know what the data mean and you can't plan for any occupational training on the basis of such data. Therefore, we've eliminated such headings. For example, you will find the professional, technical and managerial areas in Divisions A through I. If you want to have continuity on the basis of the present classification structures you can add up the data for the separate divisions in the SOC. But we feel that from an analytical point of view and from an education planning point of view, it's best to be able to present these data separately. In this way you know exactly what groups they represent, and the data becomes more meaningful.

There are certain concepts and features also incorporated in the SOC which we have taken from other structures. For example, the format of the sales area is taken from the ISCO, in which the definitions are integrated with the classification structure. This arrangement enables the user to easily relate occupations in one group to those in other groups, and the users are assisted all the time by definitions. The lack of definitions is one of the major drawbacks of the census structure; there are many titles but you really don't know what they mean. Many people also have expressed a desire for specific information about occupations without the definitions becoming overly precise. The DOT particularly is deficient in this area; there are a lot of highly precise definitions which in reality are tasks of occupations. Our aim is to have definitions which are fairly exact, but not minute in detail.

One of the reasons for broadening the number of areas is to take into account the career education concept and the trend towards training for clusters of occupations. We feel that the system should relate

specific occupations to a spectrum of occupations, so that there should be easy transferability and wider exposure to the world of work. In this regard, we have some good examples to follow: The Canadian system, for example, has 23 major divisions, and the British system has 18. So, we are going along with the trend of the latest research in occupational classification. To the best of my knowledge, the Canadians are not complaining about their structure; it was issued in 1971. It was used for their census, and is being used in their manpower programs and their employment service. We feel, therefore, that we're on the right track, even though some significant changes may have to take place in the collection and presentation of data because of the new structure.

The project has had many difficulties, as you can surmise from the fact that we've been at it a long time, and haven't published anything. However, we're getting close to issuing a draft, but there are three areas which are proving troublesome. They are the blue-collar workers, the service occupations, and the laborers group, or as we call them, elemental workers. The blue-collar occupations are particularly difficult to deal with because we're trying to reconcile the DOT categories dealing with processing, machine trade work, structural work, and miscellaneous occupations with the Census groups concerned with craftsmen, operatives, and laborers. One of the reasons we are having difficulty is that we've been told that people using these data would like to see skill level distinctions established in this blue-collar area, and those of us who have worked or know something about the learning and skills can appreciate the difficulty of setting up groups with definite parameters which set off skills.

The service occupations area is presenting difficulties because of the technological and educational changes that have been taking place. For example, traditionally, laundry workers have been in a service area, and yet when you look at what they're doing it's almost a factory type job. We're not sure as to whether or not they should be pulled out of the service area and put into the blue-collar area. Likewise, policemen now are fairly well educated and there are junior colleges offering law enforcement programs. Consequently, some people are insisting that they be classified with the technicians.

We intend to issue a draft at the end of this month, a very rough

one I must say. The draft will be circulated only to those government agencies which expressed an interest in the program. Some of the members of our inter-agency classification committees, and work groups also will receive copies. Based on the comments and suggestions received, the draft will be revised, and the second draft will be circulated throughout the country to all kinds of public and private organizations. I would say that, before a final draft is released, we have from two to three years to go, at the least.

Before I close, I would like to mention something which is related to another topic but is in the occupational classification area. And that is, over the past year, Otto Legg of the Office of Education and representatives of the Labor Department have been working together to set up a cooperative arrangement to revise, Vocational Education and Occupations. As you know, this publication was issued in 1969, and linked the U.S. Office Education classification structure, concerned with vocational education offerings to the DOT titles, codes and the worker traits. The book has been used a great deal throughout the country since its publication, and we are now at the stage where we are ready to revise it. The upper-echelon officials of the Labor Department and of the Office of Education have indicated their support in a very concrete manner. They have allocated financial and personnel resources. Letters have been sent to State Directors of vocational education for comments and recommendations for revising the publication. In addition, an inter-agency agreement has been drawn up for the development of occupational manpower information. Also, an advisory committee is being established that will guide the project. One of the new things we hope to insert into the document is the consideration of some BLS materials. For example, information about the Occupational Employment Statistics (OES) program will be incorporated into this book so that it will have the sort of scope that will take into account many of the things in which you people are interested. Of course, the problem is when we revise this, how will we take into account the SOC, the revised Dictionary of Occupational Titles, which will be published next year, and the new Office of Education taxonomy which will be replacing Handbook VI, and the Taxonomy of Instructional Programs in Higher Education? In the field of occupational classification, we now have a much broader viewpoint than we

have ever had, and we hope that we are looking at the world of work in a more realistic manner. In this way we hope to produce what you people want.

Major Divisions in Three Occupational Classification Systems

Census Occupational Classification System	Dictionary of Occupational Titles	International Standard Classification of Occupations
001-195 Professional, Technical, and Kindred Workers	0/1. Professional, Technical, and Managerial Occupations	0/1. Professional, Technical, and Related Workers
201-245 Managers and Administrators, Except Farm	2. Clerical and Sales Occupations	2. Administrative and Managerial Workers
260-280 Sales Workers	3. Service Occupations	3. Clerical and Related Workers
301-395 Clerical and Kindred Workers	4. Farming, Fishery, Forestry, and Related Occupations	4. Sales Workers
401-580 Crafts and Kindred Workers	5. Processing Occupations	5. Service Workers
601-695 Operatives, Except Transport	6. Machine Trades Occupations	6. Agricultural, Animal Husbandry and Forestry Workers, Fishermen and Hunters
701-715 Transport Equipment Operatives	7. Bench Work Occupations	7/8/9. Production and Related Workers, Transport Equipment Operators and Laborers
740-785 Laborers, Except Farm	8. Structural Work Occupations	X Workers Not Classifiable by Occupation
801-802 Farmers and Farm Managers	9. Miscellaneous Occupations	—Armed Forces (no code)
821-824 Farm Laborers and Farm Labor Supervisors		
901-965 Service Workers, Except Private Household		
980-984 Private Household Workers		

STEVENS: I suspect that those of you who were about to mix the concrete in which to set your systems better shut off the water because it sounds like there are a number of things in the pipeline that will be important in the way that a state system develops and relates to other state systems. Our next speaker is well-known to most of you. He is Leonard A. Lecht, Director of the Special Projects Department of The Conference Board, headquartered in New York City.

LECHT: There is a major challenge ahead in guidance and counseling and changing enrollments within vocational education to help erode the traditional stereotypes of men's jobs and women's jobs. And if dare we do that, and do that in many different places as well as vocational education, then the "What would happen if?" would be closer to people's aspirations rather than to projections of past trends. I am going to spend some time discussing a study we have made for the U.S. Office of Education of changes in occupational characteristics in the next decade and their implications for planning in education. Most projections deal with future job openings. For example, how many positions will there be in the next ten years for carpenters, or medical technologists, or policemen, or what have you. This is only one dimension of the information which is needed for planning in vocational education. There may be a great many job openings in some occupations, but they may pay poorly. We may not want to train people for those occupations even if there are plenty of jobs. Or, we may be training people for jobs that college graduates are entering in larger numbers. Here it would be important to know if the vocational education training is adequate to meet this new competition. And how important is this new competition? More importantly, many occupations in the past have had large concentrations of high school dropouts in their work force. The critical information here is the sharp decrease in the representation of persons with less than a full four-year high school education in most occupations and the probable continuation of this trend in the next decade.

Legislation pressures make vocational education responsive to social changes such as The Civil Rights Movement in the '60s, or the Women's Lib

Movement currently. Accordingly, one of the critical pieces of information about an occupation is what kind of employment opportunities it offers for women, or for non-whites. We have been attempting to develop this information both in terms of historical information and also projections.

Now, a word about projections. Some people regard them as the work of the Devil. Others think they're something like a bookkeeping document on an accountant's statement. As I see them they are neither. Projections spell out the implications of a scenario. They're a story that says with numbers--What would happen if? What would happen if the economy grew at a faster or a slower rate? What would happen to job seekers problems if the labor force grew as we anticipated? The projections I am presenting are basically extrapolations of the experience of the 1960 to 1970 period as modified by developments in the first half of the '70s and judgments about the future. The what would happen if story says--What will happen if past trends continue? In many cases we hope they don't continue. One of the aspects we can be reasonably sure of is that most of the job openings are in larger occupations. This is especially true of the occupations we're concerned with in this study. They are the ones which people with high school diplomas typically enter or in which vocational programs are offered. A great deal of attention in vocational education tends to be given to small occupations, occupations which are often regarded as providing significant opportunities. Engineering Technician would be one. These often offer attractive careers. But by and large, the job openings in the next decade are going to be in large occupations, which account for an average of half a million jobs or more a year. Auto mechanics or secretaries are examples. As part of our study, we examined the U.S. Office of Education's enrollment projections for 1977 and we compared them with our projections of annual average job openings for the overall 1970-1985 period. This kind of comparison can be overdone because vocational education is both a manpower program, and it is an educational program as well. Student interest and the availability of faculty are important along with knowledge of job openings in program planning. It is significant that there is a rough consistency between projected enrollments and job openings in most fields. There are also inconsistencies, and the largest one is in

the field of Agriculture. In 1977 the Office of Education projects that about 9% of the enrollment will be in Agricultural vocation education courses. In terms of job openings, about one half of 1% of the job openings are expected to be in Agriculture. One of the suggestions here is that this is not too relevant a comparison, and that the more relevant comparison is with the broader range of job opportunities connected with the field of Agriculture, the agribusiness occupations. Including the agribusiness occupations which have a close relationship to Agriculture would raise the job openings figure to about one and one half percent. What does this signify? To me, it signifies that we ought to recognize that much of the agricultural vocational education isn't a manpower program. We recognize this in the case of the homemaking program where we distinguish between "gainful" and other homemaking. Here we recognize that it is desirable to learn how to cook or about vitamins and nutrition even if this knowledge doesn't contribute to GNP. I think it is time that we recognized the same thing about the Agricultural programs. A small part of them are related to gainful employment. A majority of these programs serve other social values and interests which are also worthwhile preserving. To continue the job openings enrollment comparison, if we look at distributive education, there are many more job openings expected than enrollments in that field. So, this is an area where the vocational programs to date have only partially served the potential of the market. The same thing is true with health occupations. There has been a rapid growth in enrollment in these occupations recently but they are still relatively small compared to job openings in these fields. Otherwise there's a rough consistency. The office occupations have about the same share of enrollments as the jobs, trades and industry something more, technical occupations about the same, etc. So while there is a general relationship between job openings and enrollment in vocational programs, it's a rough one, and with many deviations. Moving on from job openings to educational attainment, I should mention that our study concentrates on the occupations which do not typically require a four-year college degree although some college graduates are represented in them. More college graduates are expected to be represented in these occupations. Persons with 16 or more years of schooling are expected to grow slightly from about 7% to 9% of the total in the occupations our

study is concerned with. This means that there will be more college graduates than has been true in the past entering white-collar administrative and technical fields. However, it doesn't look to us that the college graduates including Ph.D.'s will be competing for taxi driver's jobs in large numbers or that engineers or teachers who have difficulty in finding employment will often attempt to become hospital attendants or medical technicians. So, while in good reason for frequently upgrading vocational programs, the competition of college graduates is a lesser one. The major development in educational attainment is the sharp decline in the proportion of people in the occupations studied with less than a high school education. We expect this group to decline from about 3/8 of the employment in these occupations to roughly between 1/4 and 1/5 of the employment. Correspondingly the proportion of people with 12 to 15 years of schooling is expected to increase substantially. What conclusion can be drawn from this? The initial conclusion is that the supply of well educated people will increase significantly, particularly in less skilled occupations. As that happens, and it's been happening in the past, the scarcity value of the high school credential will probably diminish. As its scarcity value diminishes the economic premium attached to it is also likely to diminish. However, for people who don't have it the penalty will still be there.

Our study has also been concerned with earnings as an important occupational characteristic. Examining the 120-odd occupations in our study we have asked, what do they pay? Our earnings data in 1970 and the projected earnings refer to the earnings only of full-year workers, of people who worked 50 weeks a year or more. Our study shows that the vocational programs prepare people for occupations which cover the earnings gamut, but there is a concentration at the lower end at less than median of the earnings scale for all occupations. For example, in 1970 the median earning of a full-year worker in the United States was just short of $10,000 a year, $9,945 (in 1973 dollars). However, over 2/5, 41% of the employed in the occupations considered, including those in which vocational education concentrates its training, had median earnings under $8,000, or $2,000 a year less than the median figure for all year-round workers. About 5/8 of all the people working in the occupations studied earned less than the median for all full-year workers.

On the other hand, some occupations included reported median earnings in the $16,000 to $18,000 bracket. These are primarily specialized technicians, people like draftsmen, etc. The point here is that in the past little attention has been paid in setting up training programs to the earnings in the occupations for which people were being trained. Frequently little attention was paid to their job security or their opportunities for upward movement. And while the projections are of some interest here, the story is told equally well by the historical data. To cite one instance, I recall that in the mid-1960's there was a great deal of attention paid to what were called New Careers, nonprofessional human service occupations. These were fields that presumably people could enter with little formal training. Instead, it was believed they could draw on what was called their experience in life. New Careers would include fields like teacher's aids, health aids, and in some cases social working community aids, etc. Numbers of persons were trained in manpower programs or vocational programs for these positions. Several considerations were overlooked in planning these programs. One was that they paid poorly, usually close to the minimum wage. Another was they had very little job security. A third was that in practice there were very few channels of upward mobility by which a person could move out of those occupations into something better. I would also venture to guess that most of these occupations had very little in the way of fringe benefits, retirement provisions, health benefits, etc. Currently, few people are being trained in these fields. The point to be made is that earnings indifferent fields are one important consideration to be taken into account in program planning. Certainly, it's just as important as how many jobs are expected to materialize. In some instances, it may make sense to train people for occupations which pay considerably less than the median. And it may make sense to do so because they may be people that have limited learning ability. But, people ought to know what they're likely to earn in the field after their training.

We have been emphasizing jobs as occupations, as key to economic status, and as a way of upgrading people who in the past have been left out of the main stream of our society. And certainly women and blacks are the two major groups in this category. There has been a great deal of emphasis recently on affirmative action programs and equal employment

opportunity programs. When we started this study, we thought we would see very far reaching changes in the occupation distribution of women and blacks. We looked at our data from two perspectives to note evidences of change. One was to look at the young people separately and the other, the overall work forces and compare the changes in the representation. What we found is that there had been some changes in the occupational distribution of nonwhites and women in different occupations, but that these changes have been relatively modest. Frequently, the changes are greater in the case of blacks or nonwhites, to use the census term, than they are in the case of women. What stands out predominately is the continued concentration of the employment of younger women, that is the 18 to 34 year range in what has been regarded as the typical female occupations in the past. Now there are changes. There are many more women in real estate fields; there are small numbers of women entering various craft occupations, more women policepersons and so forth and so on. But what dominates the data is the modesty of the changes. Take secretaries as a strong case: In 1960, 97 percent of the secretaries were women, while in 1970 97.5 percent of the secretaries were women. If you go to the younger woman in the field, the under 35 group, and you look at them separately, you would find the proportion is virtually identical. Yes, among the secretaries in the 18-34 year age group, 98 percent of the secretaries are women. We may be headed on a collision course here. Occupational aspirations among women or blacks are changing with government support and community support. At the same time only modest changes are taking place in their occupational representation. What does this imply for vocational education? It has many implications which include vocational education and others. If you would look at the distribution of enrollment in vocational education, you would find that it tends to be close to the current employment distribution for women.

Study of Changes in
Occupational Characteristics

Table 1

Distribution of Employment in Occupations Studied Grouped by Size of Occupation, 1970, 1985

Occupations with Employment of:	Distribution of Employment	
	1970	1985
	100.0%	100.0%
Less than 100,000	3.2	2.6
100,000 to 249,999	12.8	9.7
250,000 to 499,999	21.5	12.1
500,000 to 749,999	8.7	16.2
750,000 to 999,999	18.5	8.9
1,000,000 to 1,249,999	0.0	12.9
1,250,000 to 1,449,999	6.3	4.8
1,500,000 to 1,999,999	7.4	9.1
2,000,000 and over	21.5	23.6
Total Employment (in thousands)	43,399	57,235

Table 2

Comparison of Projected Vocational Enrollments with Projected Average Annual Job Opportunities in Occupations Included in Study

Program Area	Distribution of Projected Vocational Enrollments in 1977	Distribution of Average Annual Job Opportunities 1970 to 1985
Agriculture	8.9%	0.6%
Distributive Education	9.1	25.2
Health Occupations	5.6	9.5
Home Economics (Gainful)	5.2	5.4
Office Occupations	28.7	29.2
Technical Occupations	4.5	2.0
Trades and Industry	38.0	23.3
Other (1)	--	4.8
TOTAL	100.0	100.0

(1) Refers to job openings in occupations not currently trained for in vocational programs.

Distribution of Employment in Occupations Studied by Educational Attainment Grouped by Percent in Occupation Completing 12 to 15 Years of Schooling, 1970, 1985

Occupations grouped by percent of workers completing 12 to 15 years of schooling	Distribution of Employment							
	1970				1985			
	Total	Less than 12 years of school	12-15 years of school	16 or more years	Total	Less than 12 years of school	12-15 years of school	16 or more years
Less than 20%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
20.0 to 39.9	23.7	39.6	14.4	7.8	3.0	6.6	1.6	2.5
40.0 to 59.9	45.2	46.3	42.4	60.7	20.2	36.3	14.9	19.6
60.0 to 79.9	18.7	10.6	23.9	23.9	51.2	47.9	50.4	65.0
80.0 to 100.0	12.4	3.5	19.3	7.5	25.6	8.3	33.1	12.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total employment (in thousands)	43,399	16,741	23,697	2,961	57,235	13,033	39,003	5,199
Percent distribution	100.0%	38.6	54.6	6.8	100.0%	22.7	68.2	9.1

Table 4

Distribution of Employment in Occupations Studied Grouped by Median Earnings, 1970, 1985 (in 1973 Dollars)

Occupations with Median Earnings of:	Distribution of Employment	
	1970	1985
	100.0%	100.0%
Less than $6,000	12.3	1.0
$6,000 to 7,999	29.1	5.8
$8,000 to 9,999	23.8	16.8
$10,000 to 11,999	14.7	17.0
$12,000 to 13,999	7.8	10.1
$14,000 to 15,999	2.1	11.0
$16,000 to 17,999	10.0	14.2
$18,000 to 19,999	0.0	7.1
$20,000 and over	0.3	17.1
Total Employment (in thousands)	43,399	57,235

Note: Median earnings for all U.S. occupations was $9,945 in 1970 and is projected to rise to approximately $15,000 by 1985.

STEVENS: Thank you Leonard. Next on the agenda is a panel of three reactors to this morning's speakers. After they comment we will accept questions from the audience. The three reactors are: Dr. Robert Morgan, associated with North Carolina State University; Joyce Shackett, associated with our MOTIS project at the University of Missouri; and Alan Williams, Senior Lecturer in Industrial Relations, Massey University in New Zealand. Alan is a visitor on our campus this year, and is also involved in New Zealand with the kinds of things we are discussing, so I thought his remarks would be of substantial interest.

Bob, Joyce, and Alan will comment in order as they were presented.

MORGAN: [unedited] There was quite a bit of information presented here. Certainly, I think it reflects the national temper at the present time--from very glowing comments to pretty grim kind of comments by Mark Sanders. Certainly the location within the structure has a lot to do with your perception of how manpower data is best utilized, and with that respect I need to tell you as a point of background information, we have just completed a national study of ten exemplary states, one from each geographical region, in the use of manpower data for vocational education and in the use of manpower data for more comprehensive manpower planning which includes the CETA Act. There were over 400 interviews conducted and we're currently producing the final report on that. Also, at the same time, a concurrent project funded by Part C funds OE, brought together some forty separate agencies to try to identify what are the information needs, and this got into the manpower area. So, in light of these two studies, I'm going to attempt to highlight some major areas. In the first two presentations there was a note of an adversary relationship between those who produce the data and those who use the data. This adversary relationship, I think, essentially is around the whole business of finance of the collection of data. Certainly in the VEA Act $5 million was set aside, authorized, never appropriated; I think this certainly shows educators' true interest in manpower data--it's indicative at least. There are exemplary practices across the nation where there is actual financing of the collection of data by ES or BLS for specific

occupational areas. Probably the best example of this is in Oklahoma of a continuing relationship. In terms of the geographic areas that were spoken about, need for information on smaller geographic areas, there are certain problems that have to be solved by the educational community, before any substantive work can be done, and that's the definition of a service area. How big of an area is an institution serving? You've got prime sponsors that overlap with community college districts, that overlap with local school districts, and nobody wants to define what their service area is. So you get, even if you get local demand data, the suppliers all will be basing their training on the demand without regard to the fact that other institutions are coming in with supply; you've got in-migration of skills and out-migration of skills that we have no data on; you've got within career mobility and we have no data on that, or very sparse at best. Certainly there was attention throughout all the talks about the cross-walks. Now, during Manny's presentation, we hear that we're not going to do away with all the other systems. We're going to have one more set of cross-walks. That's a sad statement to me. Until we get some kind of standardized occupational pivoting structure, people are going to be collecting data that is not directly comparable. This is a particularly critical problem in the OE program code cross-walk to the Census code. It really creates a serious problem because we know that not all people who enter a vocational program are going to enter that particular occupation, or set of occupations which are related to it. Yet we treat enrollments or graduations as though these people were part of the labor force, when in a recent study I just completed, only 30 to 40 percent of the average programs enter the occupations trained for. So, we have a supply picture that's really kind of grim. There needs to be a great deal of work on the supply. What educators need though, is not supply or demand, they need net demand, and right now we don't have it. Certainly it's encouraging to hear that [unintelligible] and Handbook Six. It's gratifying to hear that there's some closure on the SOC, but I want to make one point in coming to a close here. We talk about job demand on the one hand. We talk about student interests on the other hand. What I would hope would come out of this conference is not in that interpretation section, is how do you rectify the clear fact that often job demand does not create student

interest? And the converse also being true, that student interest does not generate job demand. I think this is an issue that really is causing a lot of problems in the utilization of manpower data. The finance of education is based on student interest, on enrollments in those programs. The day that it is based on placement, rather than enrollment, is going to be the day that we have a significant change in the view of manpower data and its use. So, when you look across the nation, the way that money gets funded to the local school systems is usually based on enrollments and not on placements, with few exceptions. Until that gets rectified manpower data will probably not get utilized. I should say that from the standpoint of demand data, the educational community is generally satisfied, but it needs net demand and it needs some incentive for utilizing the data that are already there.

SHACKETT: The problem I have in looking at the presentations, in terms of my own reactions, is selecting just a few things to react to at this time. There has been a wealth of information presented this morning that I find very interesting.

I find myself thinking, from my point of view as a producer, of the conflict that has been presented between the producer and the consumer of data. In other words, there is conflict between the person who generates data and the person who is ultimately going to use that data in decision-making.

I think this is a very important consideration. It is something that is not discussed enough, and it will fit into the general framework of the problem of non-communication that was mentioned earlier in regards to the problem of programs being duplications of each other by touching the same areas and thus duplicating materials and services. There is simply not enough communication, and hopefully the type of conference we are having here will help to eliminate that problem.

Specifically, I think there is a misunderstanding existing between the producers and the consumers in the aspect of what is feasible. Now, we can't really deal with what the consumer wants. What he wants is something that would give him complete and perfect information, and we

have to recognize that we are not able to give him that kind of data, even though it would be very nice. What we should talk about more frequently is what can be done and what data can be developed that will prove useful to the user of the data.

It is important that the data users understand the fact that the occupational projections generated by data producers are meant to be long term projections. Further, these projections are based on past experiences and employment trends and on explicit assumptions concerning what things are going to remain stable in the economy. The assumptions deal with issues such as technological change, the changing social structure, the number of women and non-whites entering the labor market and looking for work in certain occupations, the percentage of specific occupations that are employed in certain industries, how constant such percentages are, and so on. The assumptions we data producers make have weaknesses. We are aware of those weaknesses and try to account for them as best we can.

There are many elements in a system that data users need to consider when making decisions concerning vocational education programs and various training programs. The occupational projections generated are an important part of this system. Information is needed on technological trends within the economy. There are changes in social structure and various unique informational data that only local educators know about.

In the process of converting generated data and information to fit local needs, this last matter is a very important point. To repeat the statement, there are some things that only local educators will know about. For example, they may know that a new company is moving into an area, or that the recent graduates of certain vocational education programs have not been able to get jobs after leaving school. This type of information is very important. It is essential to realize that the data producers' occupational projections are not intended to be the data user's sole tool to use in making decisions. They are meant to be a part of the information a data user applies to decision making; a small part in some circumstances, and a very important part in others.

There are many things the data user must consider. For proper utilization of the data generated, the occupational projections for the

future, information about technological trends, and various other bits of information obtained from various sources must be matched together and analyzed. It is critical that you realize that this is not going to be a simple procedure. We cannot give you a series of steps to go through that will give you an answer to questions such as what programs should be funded, what programs should be dropped, and what programs should be maintained at their current level of funding. What we can give you is an outline or a procedure to follow detailing things you can and should consider in making your decisions. Such an outline will typically be somewhat complex.

Clearly, it is very important that we have more coordination of activities and more cooperation between the people who are promoting data generation, the data producers, and the data users. Only when there is coordination and planning can a system be built which will be truly useful. Data producers must know what the data users are attempting to do. It makes a great difference in the type of data generated and the outline for proper use of the data if the data users are planning to use the data to alter funding and support for vocational education programs rather than just use the data for reporting purposes to various agencies.

WILLIAMS: As a visitor to the United States from a country whose total population stands at three million people, one's first reaction to this morning's program was one of awe. A condition dictated not only by the complexity, but also the sheer size of the problems confronting the professional planner in this day and age. Yet one also detects an air of confidence, encapsulated perhaps in Mr. O'Donnell's ebullient presentation, a definite feeling that policy as well as technical methodology now informs the current debate on manpower in this country.

It is a cliche, but one worth restating here, that the mark of a good conference can be found in the extent to which the formal agenda generates second order questions as the process of debate and interaction is carried on. Taking this as a rule of thumb may I therefore restrict comments to three major second order questions which I see emerging from this morning's proceedings.

1. Given the wide variety of research and program inputs that have gone into the generic manpower field over the last decade, coupled to the wide range of agencies now actively engaged in policy design and implementation, is it timely to suggest that the interests of coherence may best be served if the federal government agencies think in terms of a national labor market policy? To me it seems a paradox that in a country where so much attention has been paid to questions of unemployment and poverty, there still exists a belief in the efficiency of the market mechanism to clear the labor market under optimum conditions. Particularly since the empirical evidence of a growing residual level of unemployment after each turn of the economic cycle, reveals on disaggregation a disproportionate effect in the long run with regard to employment opportunities among specific groups. The current situation thus tends to take on socio-political as well as economic significance for the future.
2. My second implicit question involves a comment by Dr. Drake with regard to an important dimension of the agency-client relationship: the matter of trade union responses to classification changes. Such matters overseas tend to be clouded with considerable feeling, largely because the classical traditions of craft unionism have tended to make the union executive the final arbiter of what constitutes skill. In my own country where liaison tends to be fairly effective, there still lurks the feeling in the minds of many unionists that reclassification means skill dilution, and loss of both earnings and status, a fear exacerbated by increasing technological input.

   By contrast, the American principle of single agreements and binding contracts appear to have overcome much of this problem. At the same time the increasing use of occupational classification and reclassification, must of necessity be having an effect upon the bargaining process as new contracts are renegotiated. The nature, extent and kind of

effects must surely be a matter of some moment for the researcher. Upon clarity of definition there depends the future presence or absence of demarcation disputes between unions claiming jurisdictional rights over new categories of work.

3. As a final comment, may I ask a rhetorical question that is the subject of a growing literature, that stretches back to Max Weber and other nineteenth century thinkers, the question of the meaning of work itself? Anyone engaged in the task of developing and planning policy these days must surely be aware of the considerable growth of interest in work as a psychological and social human need, that joins the shop floor to the board room in a continuum. This question with its multitude of social as well as economic variables is too important to be left to the philosophers. It is my firm belief that its existence more than any other should inform the conscious thoughts of all of us here today.

STEVENS: Okay, we have about 15 minutes until we are scheduled to go to lunch. Are there questions that you would like to address to any of this morning's speakers from where you sit? We'll spend the 15 minutes in that way, and then we will disperse until 1:30 at which time we will reconvene here. Do you have questions for any of the speakers?

FIRST QUESTION FROM AUDIENCE: Someone this morning was making a comment about changing technology and the need to keep programs updated and take advantage of new trends. Now, I was wondering, to what extent (this would be, I think, the case here in Missouri) the advisory councils at the state level and the local level are providing this kind of input as to what these changes are in industry so that it can be built into the program offered. It seems to me to be a problem that we're groping with in Missouri. And if this is the case, to what extent are the advisory

bodies providing this kind of input so that you are offering relevant, current programs that are getting at this changing technology?

STEVENS: The Assistant Commissioner must have anticipated that. He left while you were asking the question. Frank Drake, would you like to respond to that?

DRAKE: I think what we're really seeking is a validation of the content in the instructional process. And an advisory council could certainly serve one way of meeting that need. When we get into rather sparsely populated areas where there are still people needs and vocational needs, we have to find some way of trying to validate. We may not always use that advisory council concept, but we have to make a contact in some other way. But, it has been a problem. We think we've made some progress.

STEVENS: Are there any participants here who think they have an optimal advisory function?

RESPONSE: It's not optimal advisory. But along the same lines, I'm from Utah. We've got quite a bit of development in the state of Utah in the coal industry. They've made large advances in technology lately. But the junior colleges and vocational institutions in southern Utah made their technological changes and skill and occupation requirements. So they're having people from various companies actually attending classes. And also teachers when they're not teaching classes, going back into the mines and spending some time with the new equipment. So they take the place of the advisory council. That's one way to do it,

I think. And I think it's going to work real well.

STEVENS: Any other vehicles for accomplishing this?

RESPONSE FROM AUDIENCE: Well, I think the last 9 months of our experience in dealing with the advisory council has been in a generalized form. They're not very effective in dealing with the technical issues, but rather can help with some of the broader policy questions in terms of how they feel about it. And as a mirror or bouncing board for professional analysis and technical information. Checking to see that it's not way out of line in local sentiment and preferences. But using volunteers to get technical information has been very unproductive and frustrating and required in our case (in New Mexico) a total restructuring of our planning system and the orientation and kind of items that we present to them. The agenda has changed radically because of the difficulty of getting feedback from volunteers on very difficult and extremely complicated information.

SECOND QUESTION FROM AUDIENCE: This is a question for Mark Sanders. Your frustrations seem to be so intense. I was wondering whether or not it reflected some of the frustrations of the first year of the Comprehensive Employment and Training Act (CETA), since I suspect from your title on the program that you have something to do with CETA; this whole problem of bringing up CETA and the Public Service Employment (PSE) money they've got thrown in. Or, does it reflect some of the peculiarities of the linkage between vocational education and CETA with respect to the time...(inaudible)... I just wondered what underlies your frustrations?

MARK SANDERS: A lot of it is caused by...(inaudible)... and it does have to do with CETA, but it has to do with our broader education system. I do not think that your manpower policy activity is alive and well in the United States. I think we aren't dealing with the broader aspects of manpower policy. We're jiving ourselves, and occupational projections in specific are a manipulative tool used by some of our labor economists to jive us about where we're going to head in terms of full employment or an acceptable employment rate. We project down the line, and our self-fulfilling prophesy then can show that we can have adjusted upward the acceptable unemployment level which means we are going to have these people who will be shoved aside, and not concern ourselves with them in occupational programs. In specific, we don't deal with the equity or equality issues. We don't deal with the racial and sexual issues in terms of who we ought to be training in the schools. We don't coordinate our activities when we have good systems because of the economy of the school districts, the political jurisdictions. In California, we've got some 140 official planning areas which doesn't even address the school district areas which are on top of those. I'm very frustrated about a lot of this stuff, and I hope I can understand what we're doing with projections here. We're not looking for a perfect tool, we're looking for something that will help us get out of the political decision-making of sticking our finger in the wind and doing what we damn well want to do anyway.

STEVENS: It will help just a little bit in our getting to know each other. The question came from Jim Kane from the governor's office in Massachusetts. Other questions? No?

All right. Again, a couple of notes. If you brought materials with you that you would like to put on display so others can take references, please put them on the tables at the back. We will have a list of participants prepared this afternoon.

We will re-convene at 1:30.

Thursday, 1:30 P.M., July 10, 1975

STEVENS: We are going to start this afternoon with Richard E. Dempsey from the Bureau of Labor Statistics in Washington, D.C. Dick will describe the BLS employment projections program and the new Occupational Employment Statistics program. Dick will be followed by Paul Braden, who is now with the Economic Development Administration, U.S. Department of Commerce. Paul was the prime mover in the Oklahoma Training Information System (OTIS), to my knowledge the first of the statewide systems designed specifically for vocational education planning purposes.

DEMPSEY: Since the early 1960s, manpower and educational legislation has continually underscored that manpower training and vocational education be conducted in areas of proven occupational need. Evaluations of manpower training conducted over the years have repeatedly cited the lack of local labor market information on occupational demand as a source of considerable concern by manpower and vocational education planners. In fact, an evaluation recently completed by the Olympus Research Corporation stated that "the absence of usable occupational data at the local level is very serious indeed." While some economists argue that the occupational market place will adjust through wage variations for imbalances between the demand and supply of workers, most recognize that this market functions imperfectly, with unacceptable lags, and more importantly, that the elasticities of substitution for many skills are close to zero.

In short, either because the data are needed for judicious planning or because of legislated reporting requirements, the data are a necessary integral part of any manpower and vocational education planning system. Without question, decisions concerning training and occupation-related educational programs are being made that involve, either implicitly or explicitly, use of occupational projections. In the past, these projections may have simply been the intuitive judgment of individual decision-makers.

The OES Program

The OES Program, a cooperative Federal/State effort, has three basic elements--the OES Survey, the National/State Industry-Occupational Matrix System, and the State and Area Occupational Manpower Projections Program. In this cooperative effort, the Bureau of Labor Statistics is responsible for the development and improvement of survey procedures and manpower projection techniques to be used by the cooperating State employment security agencies and provides a continuous program of guidance and assistance to the State agencies through its regional office system. The Manpower Administration (MA), a major partner in this effort, is responsible for the administrative aspects of the program.

Historical Development

The Bureau of Labor Statistics received in November 1972 the official Department of Labor (DOL) responsibility for providing consultation and technical assistance to State Employment Security Agencies concerning State and area occupational projections. Unofficially, the Bureau had to a limited extent, been acting in an advisory capacity since the late 1960s, or since the release of the first four volumes of the *Tomorrow's Manpower Needs* series. Prior to BLS involvement, however, there had been a program for the development of such data centered in the Department's Bureau of Employment Security for well over a decade. The basic methodology proposed was referred to as the area skill survey.

The procedure followed in this "survey" was for State employment agencies to conduct a personal visit and/or mail survey of local employers requesting data on current occupational employment and forecasted requirements. Forecast periods ranged from one to five years, and estimates of replacement needs were often requested as well. Economic assumptions and lists and definitions of occupations varied from survey to survey, and the efforts were often one-time studies.

Concern began to grow during the mid-1960s regarding the value of this procedure. Critics raised not only practical questions such as high costs, short life of the projections, and lack of uniform standards, but also questioned the conceptual underpinnings of the effort, the ability of employers to be reasonably successful forecasters of their own manpower needs. Several limited evaluations followed that, while inconclusive, tended to reinforce the scepticism of many labor

economists. (This view was recently supported by a much broader based evaluation of employer forecasting compiled by MACRO Systems Inc. This report concluded that "employer forecasts of manpower demand are unreliable," and that employer forecasts of employment change often show little improvement over a naive no-change assumption.) The disenchantment culminated in 1968 when the Advisory Committee on Research to the U.S. Employment Service recommended in its report on labor market information that the present area skill survey program be phased out. Furthermore, the Committee suggested that "Active experimentation should be initiated to test the feasibility of the BLS occupation-industry matrix as a method of forecasting demand in large local labor markets on a State-wide basis." With this urging, BLS began the experimental work that culminated in the OES Program.

The OES Survey

In 1970, BLS, MA, and a number of State employment security agencies initiated the OES Survey. Currently 28 States and the District of Columbia are cooperating in this program. This is a mail survey program designed to produce estimates, for a specific period of time, of occupational employment by industry for the entire nonagricultural wage and salary workforce. This survey of establishments covers a three-year cycle. For example, manufacturing industries are surveyed every third year, as are nonmanufacturing industries, except trade; and trade industries. The survey data are used to estimate total employment by occupation, by industry, for each State and for areas in each State designated by the cooperating State agency. Employment estimates are possible in this program for more than 2,000 individual occupations. Although most occupations listed require some form of training for entry, the list does include entry occupations, or those requiring only a few weeks of on-the-job training.

The OES survey is important to the development of labor market information. For example, the survey program provides a systematic, conceptually consistent approach to data collection, employment estimating procedures, and occupational and industry classification, at the national, State, and local levels. The data coming from the program make possible the preparation and dissemination of accurate, up-to-date information on occupational employment for use by vocational counselors

and others interested in helping young people in a transition from school to work. Information from several survey cycles makes it possible to analyze the changing occupational composition of business and industry and to project industry employment patterns with greater intelligence and accuracy. Furthermore, the data provide a basis for addressing the analysis of demand and supply for more occupations than ever before. Beyond the information needs of young people, data from the OES survey have other, equally important uses. For example, the data make it possible to study the effect of public and private training programs on the supply of trained workers. They can facilitate the study of the effects of shifts in public and private demand and changes in technology and industrial organization on occupational manpower requirements. They can be used to assure that local manpower conditions are adequately understood. More uses will be identified as the data become generally available. Already local employment security agencies have found the survey data useful in job placement activities and major corporations have found it useful in market research. Perhaps the most significant application of the data is the development and improvement of industry-occupational matrices at the State and area levels and, ultimately, at the national level.

National Occupational Employment Projections

The industry-occupational employment matrix or table has for over a decade been a principle tool in the preparation of national projections of occupational employment. The present national matrix shows employment in about 420 specific occupational categories cross-classified by 201 industrial sectors and six class-of-worker categories. Both occupational categories and industrial sectors are exhaustive so that the matrix is comprehensive of all employment. Viewed in another way, the matrix illustrates the occupational profile, or percent distribution, of employment in each industry sector. These profiles or occupational patterns can and do vary substantially since each industry will seek to utilize a certain combination of skills in its production function. It has generally been hypothesized that the occupational structures of many industries remain relatively stable over time. Consequently, if good information is available on the occupational composition of individual industries for a base period, these data can be applied to projections

of employment by industry to yield initial projections of occupational employment for the target year.

However, in many industrial sectors occupational patterns do change significantly over 5-10 year periods with the advance of technology, the supply of workers, wage structure, and a myriad of other factors. Hence, information on the influence of these factors is used to modify the occupational patterns of the individual industries. In actual practice then, the adjusted or projected occupational patterns are used together with projections of employment by industry (developed exogenously from the matrix), to prepare projections of occupational employment.

Simply put, the preparation of occupational projections through a "matrix approach," requires two basic inputs, namely, a set of industry-occupational staffing patterns for a target year, and a corresponding set of industry employment projections. National industry projections are developed through use of a 134 sector input-output model, regression analysis, and special studies of individual industries, based on normative assumptions about the economy in the target years.

National-State Matrix System

In 1972, we began work on the National-State Industry-Occupational Matrix System. Our first goal in this element of the OES program is to provide for each State and the District of Columbia a base period industry-occupation matrix that is consistent in format, concept, and data base with the National matrix. Through support of the Manpower Administration, we purchased special tabulations from Census for each State showing employment by detailed industry, by detailed occupation, and class of worker. While presently not part of the system, data were obtained for all SMSA's of over 250,000 population, and some county groupings meeting the same population criterion. Following guidelines developed by BLS, State agencies were responsible for preparing detailed industry employment estimates by class of worker and other basic input, as well as for review of the special tabulations.

A second part of this system is a generalized computer software package to enable area analysts to manipulate the matrices for a variety of purposes. For example, various modules will permit the analyst to produce projections of occupational employment, update the matrix with new industry estimates, and integrate OES survey data as it becomes

available.

Replacements

No discussion of occupational employment projections would be complete without a consideration of replacement needs. Many analysts have expended considerable time, effort, and money to develop complex and sophisticated models that generate projections of occupational growth or decline, forgetting that for most occupations and for many States and areas, replacement needs will form the overwhelming proportion of future job openings. I would like to make clear that I am talking about separations from the labor force, not occupational or geographic mobility. For the Nation as a whole, from 1972 to 1985, about two-thirds of all new entrants to the labor force will be needed to replace workers who die, retire, or leave the labor force for other reasons.

The relative importance of replacement needs is often even more significant by State, or by occupation. For Pennsylvania, a rather slow expansion of about 9 or 10 percent in total employment is projected to occur from 1970 to 1980. During this period about 4 times as many job openings will be generated by separations from the labor force as are due to expansion, 1.6 million as opposed to about 400 thousand. In the professional category, replacement openings are about twice the number of projected growth openings, while in the operatives category, over 250,000 openings will occur due to separations while virtually none occur due to growth.

In the Baltimore SMSA, total employment is projected to expand about one-fifth from 1970 to 1980. Here, replacement openings are expected to be one and a half times greater than growth openings. Even in Florida, one of the fastest growing States in terms of employment, replacement openings are expected to account for almost half of total job openings. Growth is expected to be about two-fifths in the period from 1970 to 1980, with total openings of nearly two million and over one million generated by replacement needs. It is clear that any projection system that ignores estimates of deaths and retirements will present an incomplete and biased picture of occupational manpower needs.

In Volume I, Appendix A of the original TMN series, the Bureau presented national occupation-specific death and retirement rates by sex to aid State agencies in developing estimates of separations by

occupation. These rates were computed by applying age-specific rates from national tables of working life to the national age distributions for each occupation in 1960. Thus, the number of losses by occupation, as a percent of employment in the occupation, provided a national average rate.

Although we also described a method by which State-specific rates could be developed, most states, due to data, time, and resource limitations chose to use the national rates to estimate separations. Such procedure assumes that the age distribution in any State or area closely approximates that for the Nation. Research undertaken subsequent to the release of TMN and published in Bulletin 1769 tested the validity of that assumption and also investigated some relatively simple procedures for revising the national rates to remove discrepancies when used for States and areas.

These tests showed discrepancies ranging up to 27 percent with differences of 10 percent or more common. Thus, we concluded that for some States and areas, the use of national rates introduced serious error, and further, that no simple adjustment, for example, based on median age, would correct the difficulties. During the development of the National-State Matrix System, we undertook the task of developing occupation-specific rates for all States and the District of Columbia. This project has been completed and State tables of rates were recently published as Supplement No. 4 to the TMN series.

I would like to emphasize again the importance of replacement estimates when we wish to have a complete picture of manpower needs and the accuracy required for a set of growth projections. As I mentioned previously, if accuracy in total openings is the desired criterion, then the permissable error in occupational change projections will vary according to the growth rate of the area and the prevailing death and retirement rates. For examples of extreme cases, assume that the acceptable error in <u>total openings</u> is 10 percent. If the 10-year growth rate is one percent and the annual death and retirement rate is 2.5 percent, a projection of growth openings could be in error by as much as 260 percent. At the other extreme, if the growth rate for 10 years is 90 percent and the death and retirement rate is one percent annually, we could afford only 11 percent in our growth projection, to remain

within the 10 percent level of accuracy in total openings.

Occupational Supply

We are mindful of the fact that the need for projections includes both projections of occupational employment requirements and occupational supply. While the OES program to date has concentrated on the development of current and projected requirements data because of resource constraints, we must begin to fill the data gap concerning supply to provide information relevant to the needs of manpower and education planners.

The supply concept, or definition, used in the Bureau's work falls under the term "potential supply." The concept of potential supply includes, in addition to current supply, persons qualified for the occupation who are not members of the current supply. The analysis, then, involves the flow of workers into and out of occupations and involves a comprehensive study of occupational mobility; geographic mobility; emigration and immigration; completions of specialized and private vocational training programs, higher education training programs, employer training programs, and government sponsored training programs; the proportion of individuals completing specific training programs who enter specific occupations; and patterns of separation from and return to the labor force.

Although there are major gaps in the available national, State, and local data needed to carry out the comprehensive analysis discussed above--particularly for occupations other than professional and technical--we are taking several steps to respond to the needs. We have, for example, developed a revised edition of Occupational Manpower and Training Needs, which sets forth all the quantitative national data we have on occupational supply. This new publication will be released in a few weeks. We have contracted with the Manpower Administration to conduct a survey of training in industry, which is designed to produce information on employer training in selected occupations in the metalworking industry, including enrollments, completions, kinds of training offered, duration of training, and characteristics of the persons doing the training.

In addition, we are in the process of obtaining data from the 1970 Census of Population on occupational mobility (between 1965 and 1970), which will provide national information on the rate of exit from

occupations, the occupations to which individuals transfer, and the extent of withdrawals from the labor force. This information will help fill the void in data on occupational mobility. Furthermore, we have submitted a proposal for funding to the Manpower Administration that represents a major research program in the area of occupational supply. The program is designed to maximize the use of available data; develop procedures for filling data gaps and establish priorities in doing so; and provide technical manuals for use by State employment security agencies, and update these manuals as new information is developed. More specifically, we would provide information to the State on how to use existing data in developing supply estimates and how to analyze and present the supply-demand information for use by education planners. In addition, we would present the results of projects such as the survey of training in industry to State agencies in a format that would provide them the necessary information to conduct similar studies of their own; and, in the case of occupational mobility data, provide them with national rates of exit from occupations, which they could use to improve their estimates of occupational requirements until such time as comparable State and local data are available.

Conclusions

In addition to the specific research discussed above, the past few years of exposure to the relatively new field of local manpower projections have led us to several general, yet fundamental, conclusions concerning the overall ingredients, or elements, a projection program should encompass. First, a good deal of homogeneity exists in the technologies and economies of the various regions of this country and all are influenced to a considerable degree by national trends; therefore, a framework representing national economic and technological directions is required. Secondly, occupational demand is influenced by a multitude of interrelated factors; thus, a projection procedure should be systematic to account for as many of these factors as possible, and to force the resulting projections of occupational employment to be consistent with expected economic developments, which should, in turn, reflect trends in such demographic factors as labor force supply and migration.

In economic model-building, however, we must take care that the

form of the process does not become an end unto itself. While a general framework and consistency are necessary in preparing local projections, equally important is the first-hand knowledge of local analysts, who have experience with the local employment data base, and have knowledge of local trends, current labor market information, and other unique factors affecting the future of their particular labor market.

Finally, the program must have continuity to allow for refinement, improvements, and expansion. Projection research must be continuous, since little progress can result from ad hoc efforts. The program must have flexibility to adopt new procedures and/or improvements in data base. Most importantly, continuity in State and local agencies or institutions. What is needed is a scheduled, recurring projection effort, a program not a project, conducted by a designated staff, so that the experience and knowledge gained through each cycle of projection activity can be retained, reapplied, revised where necessary, and expanded in succeeding years. Indeed, in such continuity of effort may lie the greatest potential source of improvement in the quality of State and local labor market information, including projections.

STEVENS: Thank you Dick. Now we will hear from Paul Braden.

BRADEN: It has now been seven years since the then Governor of Oklahoma[1] indicated a strong need for a manpower information system which could assist him in formulating some semblance of a manpower policy relative to economic and human resource development. Even though we know that perfection was not then and never will be reached in providing relevant information for difficult policy questions, the Governor and his Chief

[1]The Governor in Oklahoma in 1968 was the Honorable Dewey Bartlett, now U.S. Senator. The Chief Planner was Dr. Pat Choate, who then headed the Research Division of the Oklahoma Industrial Development and Park Department and who now heads the Economic Development Administration research effort in Washington.

Planner were very pleased in 1968 with what came to be known as the OTIS, or the Occupational Training Information System.

Although OTIS had many shortcomings, its strengths were sufficient to be utilized by several other states in their conceptual design of manpower information systems.

This paper will be concerned with a review of OTIS with particular reference to recommendations for future activity. Following the overview, the paper will concentrate on discussion and recommendations in the area of manpower projections even though OTIS conceptually boasts eleven components or subsystems of which the demand component is only one. The rationale for this concentration is related not only to the nature of the conference, but also to the fact that the demand component is the focus of differing opinion on the OTIS conceptual scheme. Therefore, every effort needs to be made to re-examine this component in order to utilize the best and modify or substitute for the less desirable features.

The Need for OTIS: The Occupational Training Information System (OTIS) takes into account the necessary relationships between economic development and the availability of trained human resources. This fact is attested to by the Oklahoma experience. Since 1968, OTIS has been a prominent factor in Oklahoma, stimulating and supporting interagency economic and human resource development through the utilization of systematic and continuous information.

OTIS is designed to respond to two fundamental yet interdependent needs of agencies concerned with manpower development. The first need to which OTIS attempts to respond is the need for data on which State, local, and regional planners may base decisions to facilitate changes in manpower development plans. The changes affected require manifestation not merely in planning documents but, more essentially, in new patterns of training program offerings and enrollments which more closely approximate alignment with both the needs of individuals and the needs of the economy as a whole.

The need for a systematic and continuous information basis for making rational program decisions is seen to be interdependent with a second need. This second need is for socio-political support of sufficient quality to sustain the hard decisions which the information may

suggest as necessary if a truly relevant mix of training programs is to be implemented. The coordinated support of representative branches of all of government, business and industry, labor, and client groups is required to provide financing and support personnel for the implementation of OTIS and also to gain maximum cooperation in changing the occupational program and enrollment mix. The shared responsibility for cooperative decision-making to induce change must be supported by the provision of a common, updated, and systematic information base.

Overall Problem: By and large, local, state and regional manpower development agencies have not been able to mount coordinated programs which are both responsive to the needs, interests and aspirations of individuals and effectively targeted on developing a trained manpower flow so as to be in closer alignment with the needs of society and the economy. Lacking has been an adequate base of updated, credible, relevant, useful information for adjusting the mix of manpower development programs both quantitatively and qualitatively. Lacking also has been a set of socio-political arrangements to set the stage and develop strategies for interagency manpower decision-making.

Overall Objectives:

(1) To provide a central source of information which responds directly to the identified data requirements of interagency based manpower decision-makers which will facilitate goal setting and resource allocation decisions leading to a more effective and efficient training program mix.

(2) To provide net manpower requirements and related information which, when utilized for program planning purposes, will enhance the probable labor market success of program graduates and dropouts.

(3) To provide an information gathering capability for identifying those persons, particularly the less-advantaged, who might benefit from manpower training programs.

(4) To provide occupational analysis information which, when combined with information on trainee aptitudes, attitudes and career goals, can support qualitative program changes.

(5) To provide information to assist manpower decision-makers with meeting accountability requirements to legislatures, advisory groups, and various boards.

(6) To provide information for routine reporting to State, Regional and Federal agencies such as the U.S. Office of Education, and the U.S. Department of Commerce or Labor.

(7) To provide information for facilitating the selection of manpower development strategies which will facilitate local, state, regional and national economic development policy.

Expected Outcomes: Outcomes include more accountable management and planning of manpower programs indicated by an increase in data supported decision-making, improved interagency cooperation, better coordinated programs, more appropriately trained manpower available at the right time, better satisfied program clients, and a generally more rational formulation of manpower policy accompanied by greater articulation of manpower policy with economic development policy.

OTIS System Concept: The updated OTIS system concept, as modified for installation in Kentucky, contains eleven information components and several levels of analysis (see schematic). The central analysis served by OTIS is the interface of Manpower Supply, as adjusted by Follow-up information, and Manpower Demand so as to yield net manpower requirements. Net manpower requirements, combined with information on Underdeveloped Human Resources (UHR) and Socio-Economic Characteristics provide the needs information required for goal-identification.[2] Problems and opportunities information required for setting quantitative program objectives is identified partially through information on available Training Resources, Training Program Characteristics, and Training Program Costs. This information, combined with follow-up information provides a basis for cost-effectiveness evaluation. Qualitative adjustment of training programs is facilitated by job analyses information.

In addition to serving state manpower planning decisions, including the determination of Goals and Objectives and the selection from among

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[2]The utilization of Needs, Problems, and Opportunities data in the formulation of Goals and Objectives is suggested by the CIPP Evaluation model.

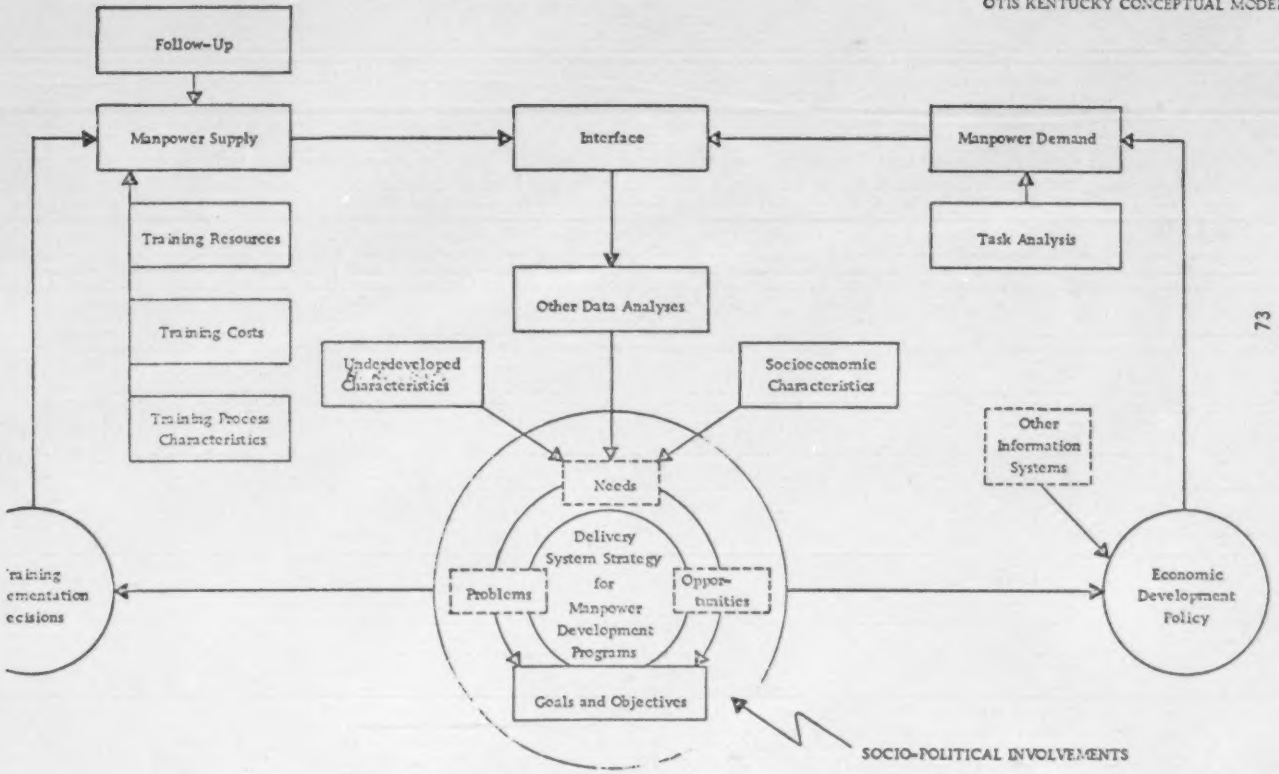
See: Daniel L. Stufflebeam, et al, Educational Evaluation and Decision Making. Chicago: Peacock Press, 1971.

EXHIBIT IV

Economic Development Administration

Evaluation Study, May 1974

OTIS KENTUCKY CONCEPTUAL MODEL



Alternative Resource Allocation Strategies, OTIS is designed also to serve Training Implementation Decisions of local manpower developers as well as economic development policy decisions (which require information from other systems.)

Background of OTIS: The key to the development and utilization of OTIS in Oklahoma was the willing cooperation of all major manpower related organizations which provided data and which were the major users of such data. In the spring of 1968, the Research Division of Oklahoma's Industrial Development and Park Department approached Oklahoma State University's Manpower Research and Training Center about undertaking a statewide manpower information system to assist in the development of a skilled labor force as an integral part of Oklahoma's strategy for economic development. Because, (1) a manifest interest at the top level of State Government, (2) the writer and Dr. Maurice Roney had recently completed a comprehensive study of Oklahoma's manpower supply,[3] (3) Dr. Francis Tuttle, Director of Vocational and Technical Education and Mr. Will Boman of the Oklahoma Employment Service were "ready" for such an undertaking and (4) Dr. John Shearer, Director of Oklahoma State University's USDL funded Manpower Research and Training Center was ready to provide vital resources, the opportunity was presented to develop a more comprehensive and integrated information system for manpower planning.

The power of the OTIS concept to support and stimulate interagency cooperation is highlighted in the development of the OTIS system in Oklahoma. After discussions with the State Department of Vocational and Technical Education and the Oklahoma Employment Security Commission in July 1968, the University secured preliminary funding for the project from the former and from the Industrial Development and Park Department. While still in the early planning stages, University personnel solicited the views and support of the variety of agencies soon to be represented

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[3]Braden, Paul V. and Maurice W. Roney, Occupational Education Beyond the High School in Oklahoma: An Analytical Study with Recommendations for a Statewide System for Manpower Development. (Stillwater, Oklahoma: Oklahoma State University, January 1968.

on the Advisory Committee. Notable among the Advisory Committee was Oklahoma's newly formed Association of Private Schools.

As soon as appropriate, the Advisory Committee began periodic meetings in which policy matters were vigorously discussed and through which doors were opened and active cooperation and participation were assured. The various agency representatives who comprised the Advisory Committee determined that existing data, however inadequate, should be pulled together so that the system could be more quickly rendered operational and also that the areas of greatest need for innovation and original data collection for OTIS could be more accurately determined. The first OTIS report (the Cycle I Report),[4] drew mainly on the supply data already collected by the University and on demand data collected by the Oklahoma Employment Security Commission in 1967. In March, 1969, funding for the full development of OTIS, incorporating the continual collection of new and improved data, was obtained by the University from the State Department of Vocational and Technical Education; Manpower Administration, U.S. Department of Labor; and, the Ozarks Regional Commission.

In January 1970, the Cycle II Report was published.[5] This report incorporated the new data generated by OTIS. On February 1, 1970, by vote of the Advisory Committee, operating responsibility was transferred from the University's Manpower Research and Training Center to the State Department of Vocational and Technical Education. The final report of the University's direct responsibility was made in July, 1970.[6] The

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[4]Braden, Paul V., Harris, James L. and Paul, Krishan K., Occupational Training Information System (OTIS), Cycle I Report, (Stillwater, Oklahoma: The Research Foundation, Oklahoma State University, January, 1969).

[5]Braden, Paul V., Harris, James L. and Paul, Krishan K., Occupational Training Information System (OTIS), Cycle II Report, (Stillwater, Oklahoma: The Research Foundation of Oklahoma State University, January, 1969).

[6]Braden, Paul V. et. al., Occupational Training Information System (OTIS) Final Report, (Stillwater, Oklahoma: The Research Foundation, Oklahoma State University, July 1970.)

first Cycle Report (the Cycle III Report) by the Oklahoma State Department of Vocational and Technical Education, was published in January, 1971.[7] Subsequently, they published the Cycle VII Report in 1975.

The OTIS Demand Component: The Demand Component or subsystem, emphasized personal contact between a census of manufacturing employers and data collectors in order to assure that (1) employers gave reliable employment demand forecasts, (2) that rapport was established among the public and private sector organizations involved and (3) that data was collected which had local applicability. Because of this felt need to involve data users in the data collection process in an effort to create built-in support for subsequent decision-making, literally hundreds of vocational teachers, counselors, chamber officials, etc., were utilized in census style area skill survey data collection efforts in Oklahoma, Kentucky and Tennessee. Some of these efforts have been discussed in great detail in the EDA evaluation report.[8]

Historical Setting: Preceding the development of OTIS in 1968, the U.S. Department of Labor had made a considered judgement to abandon the so-called area skill survey approach substituting the more sophisticated industry-occupation matrix approach to deriving manpower projections. However, to the potential user of these data it was a struggle to make a choice. Specifically, should they wait for a system which promised "better data" but experienced the usual number of developmental problems and subsequent delays or continue to use the area skill survey. Even though most of the problems could be expected with the development of any such large scale system, it nevertheless put added pressure on many to continue to utilize the area surveys, even perhaps, in new ways, e.g., limiting the request of employers to "growth data only" supplementing this with "replacement" data utilizing national or state attrition

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[7]Stevenson, William W. and James L. Harris, Cycle Three Report Occupational Training Information System, (Division of Research, Planning and Evaluation: Oklahoma State Department of Vocational and Technical Education, January 31, 1971).

[8]Macro Systems, Inc., Evaluation of the Occupational Training Information System (OTIS). Prepared for the Economic Development Administration, U.S. Department of Commerce, May, 1974.

rates. Even more dramatically, utilizing the same data collection forms as the Occupational Employment Survey program in order to collect both sets of data at the same time (the latter was never workable because of the conflict created in the different data collection methodologies employed for OES and OTIS).

Limitations in OTIS Demand Component: The limitations of demand component methodology utilized by OTIS as attested to by the EDA evaluation study are:

1. Personal Interviews are Relatively Expensive--
It costs more to collect data using the personal interview approach than by utilizing mail and limiting personal interviews to special cases only. If one measures cost directly in terms of the collection effort; there appears to be a higher cost for the OTIS approach. However, the problem of data utilization is critical and we must not overlook the fact that data collected inexpensively but not utilized for decision-making is perhaps more costly in the last analysis.
2. Overstatement of demand -- In short, both Oklahoma and Kentucky initial manpower projections were re-surveyed and the results indicated by the EDA evaluation study are:
    1. Forecast accuracy varied widely among employers.
    2. Forecast accuracy was not influenced substantially by type of forecast or employment size.
    3. Significant variations in accuracy by industry did not occur.
    4. Accuracy of the occupational forecast varied by region.
    5. Clustering did not improve forecast accuracy significantly.

According to the EDA evaluation study, these results confirm other studies which influenced the Department of Labor's initial

decision to attempt the industry-occupation matrix approach.[9]

3. The accuracy of the forecast is related to experience and dedication of the data collector -- Most data collectors were careful to observe the instructions provided at structured workshop sessions. However, a few neglected their assignment, further clouding the accuracy of the manpower forecast.

4. OTIS style data collection efforts are huge undertakings -- The OTIS area skill survey approach required the services of several hundred data collectors screened primarily for their potential as a future data user, e.g. vocational teachers, vocational counselors, industrial coordinators, planners, etc. The logistics of such an undertaking are tremendous. Jurisdictions vary, and the interagency involvements demanded are new and threatening to most. In short, one must create new avenues of communications which, in turn, generates a new set of problems.

Where Do We Go From Here?

1. The development and testing of the various OTIS components should be continued with immediate emphasis on manpower supply. There are many systems under development which show promise. Of course, additional research and demonstration is needed on a whole range of problems and opportunities relative to a comprehensive system.

2. The Occupational Employment Statistics program should be given a full trial as the primary input for manpower demand forecasting. The importance of this recommendation warrants that all of those vitally

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[9]See: (1) John Fletcher Wellimyer Associates, An Appraisal of Area Skill Surveys in Battle Creek, Michigan, and Trenton, New Jersey, November, 1965, Washington, D.C.; (2) Chernick, Jack, Manpower Forecasting Through the Occupational Needs Survey, Institute of Management and Labor Relations, Rutgers--The State University; (3) Hartle, Douglas G., Canadian Employer Forecast Survey, Canadian Studies in Economics, University of Toronto Press, 1962; (4) Moser, Collette H., An Evaluation of Area Skill Surveys As A Basis for Manpower Policies, an unpublished doctoral dissertation at the University of Wisconsin, 1971; (5) Labor Market Information And The Federal-State Employment Service System, Report by the Advisory Committee on Research to the U.S. Employment Service, U.S. Department of Labor, Washington, D.C.: and (6) Kidder, David E., Review and Synthesis of Research on Manpower Forecasting For Vocational Education, The Center for Vocational and Technical Education, The Ohio State University, Columbus, Ohio.

concerned with manpower decision-making give support to the Employment and Training Administration and the Bureau of Labor Statistics in the continued development and evaluation of this approach.

3. As recommended in the EDA evaluation, the OTIS rapport-building strategy should be employed primarily after the fact of demand forecasting. This arrangement will shift resources to a host of activities to be systematically undertaken by local data users, including:

a. *Occupational analysis* for curriculum development or micro planning.

b. *Updating of OES* data between three year survey intervals.

c. *Advisory Committee liaison*, and

d. *Identification of current vacancies.*

The occupational analysis area is worthy of further discussion since we find here the opportunity for rapport building using a systematic micro planning process.[10] If one defines macro level planning as assisting in the identification or manpower requirements with a strategy for implementation, the steps involved would make sense to individuals at the policy-making level but fall short in satisfying program directors, teachers, instructors, and trainers who need information relative to course content.

The planning steps at the micro or program level must be directed to occupational instruction. The object of occupational instruction is to give the learner the capability of performing satisfactorily on the job and improving his competence through further practice. It is necessary to know the content, the knowledge requirements, and the skill requirements to perform each of the tasks involved in the job, and the learner must be provided practice in performing tasks under realistic job-like conditions.

The following steps are suggested for implementing manpower planning at the micro level:

1. Review manpower requirements data from the macro planning level in order to identify occupations and their classification

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[10] Braden, Paul V., and Paul, Krishan K., Occupational Analysis of Educational Planning, Charles E. Merrill Publishing Company, Columbus, Ohio, 1975.

description which are or will be in need of trained manpower.

2. Identify a scientific sample of employing establishments or firms which are likely to need manpower in specific classifications and conduct a task analysis.

3. Establish program objectives in behavioral terms by reviewing potential instructional content as suggested by results of the task analysis.

4. Review the program objectives in relation to social, economic, and administrative constraints, and the characteristics of the target population.

5. Develop revised program objectives, program units, and procedures for program tryout.

6. Conduct an evaluation of graduates and dropouts in order to obtain feedback for program improvements.

In summary, I have attempted to briefly review the development of a major manpower information system effort with implication for future developmental activities. Obviously, there is a need to work cooperatively in these activities seeking contributions from many sectors. In that spirit, I extend credit to Dr. David Stevens of the University of Missouri for hosting this meeting in cooperation with the U.S. Office of Education and the Manpower Administration, U.S. Department of Labor.

STEVENS: We will now convene our panel of reactors to the sessions up to this point. If Dick and Paul will remain on stage, I will ask the following five people to join us: Roger Bezdek, Chief of the Industry GNP Branch of the Bureau of Economic Analysis, U.S. Department of Commerce; David Breneman, Senior Fellow in Economic Studies at The Brookings Institution; Carolyn Callahan, an Information and Planning Analyst from the Broward County Manpower Council, Florida; James Harris who has recently joined the State Board of Occupational Education in Denver, Colorado as Management Information Supervisor; and finally, Harvey Sokolow, Director of Research for the Wisconsin Manpower Planning Council.

[Due to faulty recording the panel's presentation was garbled. The text which follows is Stevens' recreation of the major points expressed by each speaker.]

First, Roger Bezdek's recent monograph Long-Range Forecasting of Manpower Requirements--Theory and Applications, 1974 (IEEE Manpower Monograph, Institute of Electrical and Electronics Engineers, Inc., New York, N.Y. 10017), is an excellent introduction to the forecasting topic. The monograph includes an excellent bibliography and citations to other papers authored by Bezdek.

BEZDEK: The essence of the monograph, and of Bezdek's comments, is the need to recognize the importance of explicit assumptions which underlie all employment projection efforts, and to consider sensitivity to alternative assumptions. Roger also emphasized the importance of non-marginal changes in our economy and the need to somehow incorporate them in our models, to be distinguished from continuous changes which are easier to anticipate. From his perspective as both a data user and generator, Bezdek reflected on the importance of considering sources of stability and instability given alternative courses of economic activity, and the varied sectoral impacts of these changes in the level and mix of economic activity.

BRENEMAN: [David Breneman has recently authored two papers which might be of interest to readers of this proceedings volume. They are: Richard B. Freeman and David W. Breneman, Forecasting the Ph.D. Labor Market: Pitfalls for Policy, Technical Report Number Two, April 1974, National Board on Graduate Education, Washington, D.C.; and, Doctorate Manpower Forecasts and Policy, Number Two, November 1973, National Board on Graduate Education, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.] Dave expressed pessimism about the potential for making major advances in modelling capabilities vis à vis the non-marginal changes cited by Bezdek. He also stated the view that these unpredictable events are inevitably bound to swamp the importance of linear extrapolations of past phenomena. The future role of the federal government was given as one example. Dave then mused that we might well be asking the wrong questions. Instead of seeking even more refined projections, perhaps we should be asking "what are the implications of not being able to have this projection?" What would be the curricular and manpower

program implications of concluding that we cannot produce "good" employment projections? This is one direction in which future efforts might well go.

CALLAHAN: Carolyn was the first speaker who represented a local data user's perspective. She confirmed Ed O'Donnell's earlier assertion that the producers and consumers of information lack adequate communication. She also said that very little real planning occurs at the local level. Enthusiasm for the occupational information system developed through the Governor's Office of Manpower Planning, 1801 South Gadsden Street, Tallahassee, Florida 32301, (contact person: James R. Tarr), was expressed, although Carolyn was unaware until this conference of its potential availability for local area adaptation. Local area planners need guidance in how to take data produced at the national or state level and draw from it whatever is of relevance for local use. Suggestions that you have to communicate with your community's vocational education and employment security people were not satisfactory to Carolyn because each seemingly is bound by a methodology which has been imposed on them by some other jurisdictional level. She concluded with an expressed hope that leadership in some of these areas would arise that would facilitate local area planning efforts.

HARRIS: Jim brought to the conference extensive experience in development of the Oklahoma (OTIS) and Kansas (KMUST) occupational information systems, concurred with Paul Braden's view that the area skill survey data collection method had a time, but that the time was now past. Jim expressed qualified optimism about the BLS matrix approach as "something that maybe we can start to hang our hat on at least until we can find something better." He disputed the notion that we might forego planning because of inadequate confidence in the data. Jim strongly concurred with the need Carolyn expressed for better communication between producers of data and consumers of that information. One aspect of this communication would be specific feedback about what vocational educators or manpower planners don't like. Jim expressed the view that state employment security agencies differ widely in the priority given to employment projection activities. Where such efforts are of low priority they suffer both in quality and timeliness. In vocational education settings manpower projections almost always have a high priority, which

means that in many cases independent employment projection activities have been undertaken. Harris also noted the critical importance of supply-side information in an open economy like Colorado, in which in-migration is so high. He also disputed the claim that data are needed for small geographical areas, since individual mobility is so frequent. Jim expressed his opinion that on-the-job training is vacuum-filling. It occurs when there is no trained manpower to fill the job, and should be treated as such by vocational planners. Finally, Harris reiterated the view expressed earlier that there is far too much "reinvention of the wheel", i.e., duplication of effort.

SOKOLOW: Harvey began with a recognition that manpower planning as we know it now grew out of the remedial federal categorical programs of the 1960's which were designed to alleviate immediate poverty problems. Most Comprehensive Employment and Training Act (CETA) funding is also directed toward immediate problem solving. Given this focus, Sokolow questioned whether the employment projection techniques being examined at this conference are improvements upon historical methods used to determine whether or not you should train people for certain jobs, and whether or not you could place a relatively high percentage of them. Research and demonstration projects were asserted to be supportive of the classroom training experience, both under CETA and MDTA. Harvey also called for a recognition that local Job Service offices do, at least in a number of states, have a limited amount of local intelligence and understanding of local labor market conditions. "They have been doing a relatively decent job of determining a way of training people." Seeing a clear Congressional mandate for Manpower Councils to be something in addition to providers of immediate remedial service; i.e., developers of a long-range comprehensive planning procedure that would involve manpower related activities by various agencies. Harvey shared Mark Sanders' view that the occupation-industry matrix approach is not what is sought for a high degree of reliability of projections by occupation. He then related the outcome of projections for Wisconsin which were done in 1969 for the year 1980. It was predicted that available supply would far outstrip demand even if the economy was performing well. Neither the former nor current governors recognized the significance of this. "It's incredibly frustrating to talk about the potential usefulness of

occupation methodologies if you are talking about preparing people for jobs in the immediate future. On the other hand, if you are trying to determine what the likely differential will be between total jobs and likely supply, I think it is rather important to improve upon the methods of occupation by industry projections to encourage them as much as we can."

STEVENS: Any comments?

BRADEN: On this business of planning, or not planning, I think it is fairly obvious that people, at the local and state level at least, have to plan. It's demanded that you plan. Your state legislature hits you about January or March, or whenever your particular session comes up with budgeting, and you have got to--I haven't found anybody who's willing yet to go in there and say: "I don't have all the tools at the level of sophistication I would like to have them, therefore I'm not going to play around." One of the comments that's related to that is in terms of the energy crisis. It was predicted. Several people did predict the energy crisis, and I think that they should have been using the very best models available even though they were Model T's to run those scenarios by the commander-in-chief in terms of what the implications of this thing might be. Even the embargo, you know, was at least hinted at by writers earlier than it happened. So I think you run with what you can, and then you remember that there is a lot learned from process as well as from product. In Tennessee, for example, we trained 900 teachers, counselors, bankers, Chamber people and others to go out and survey 5,000 manufacturing concerns. We learned a lot other than the data we came up with. We got acquainted. I saw top officials who didn't even know each other one agency to the next, meeting and talking about these things. We held a series of workshops and we might say promoted the importance of occupational education in the state, and since have attracted a lot of people to it. So there are some process benefits and when Dick goes thru all the gyrations that he goes thru for the OES program, and others go thru the gyrations of various components of these things, we are building towards something that will always be imperfect and will always be suboptimal. But I am still very proud of

J.P. and those others in Oklahoma who have their Seventh Cycle report and are making a lot of decisions in Oklahoma based on their report, some poor no doubt, but I hope most of them are correct. And they throw that on the table and they say if you can show me where we're wrong we'll fund your agricultural program in, say, Oklahoma City. If you can't show us where we are wrong with any stronger data or any stronger scenario, I'm sorry, you're not funded.

DEMPSEY: I will offer an observation on it. The question was raised about accuracy. A couple of years ago I was trying to evaluate the accuracy of projections, and the most difficult thing that I had to work with was how to determine what's accurate? It really boils down to "was the information useful to somebody if they needed to make a decision?" And we find if we look at it that every individual projection was different. You do not want to set some single criterion ahead of time as to what happens. You would have to sit down and see whether or not it would have been useful information or if somebody needed it. So I really throw it back to you. I'm not sure, we should look at accuracy, but we have to define what is accurate. We have tested some of our procedures in the past. We felt that they would have been useful for people making decisions. One of the questions raised by Carolyn Callahan about Jim Tarr's publication, which I also assisted Jim on; and about communications, I guess that it occurred to me when she mentioned that the local employment security person may not even have been aware that Jim and Tim were working diligently in Tallahassee is that I would certainly say that communications ought to be conducted between you and the people who are responsible for these kinds of programs in Florida. Quite frankly, Jim has been working within the framework of the Governor's Office, I believe, and is well plugged into what we are doing. You can influence him and us by feeding back thru him on this type of issue.

BEZDEK: I would like to pick up on something that Dick answered in terms of how you gauge the accuracy of the projections. I think he hit it right on the head--was the projection useful for making decisions? Now, getting back to the problem of wondering about manpower forecasting.

On the one hand, you could say: "Look it's impossible, who knows what the government's going to be doing in 1985; who knows what the economy is going to look like, the unemployment rate, and so on and so forth?" On the other hand, you construct the kind of model, or take what I call the policy-simulation approach. You have enough variables in your model so you can assume different scenarios; i.e., different federal budgets or different levels of economic activity. Let's say possibly a high defense budget, or perhaps more realistically, a high energy independence type of model. You can run a simulation and it may tell you, if for example you want to achieve energy independence by 1985, you will need twice as many coal miners or three times as many electrical engineers, and so on down the line. If you don't want to achieve semi-independence you will need only half as many, and so on and so forth. Obviously, whether or not your projection, or your forecast, comes true or not depends on how close reality in 1985 appears to your assumptions, but the important point about this kind of approach is that, say, the President, or the Congress, or some sort of national planning authority if we ever get one (God help us), could look at these type of results and if they do indeed decide to embark upon a comprehensive plan of energy independence would know what kind of manpower would be needed or required, rather than embarking upon an energy independence project without giving any thought to the manpower end of it. And the way things are shaping up now that appears to be what is going to happen. I'm not as pessimistic as my colleague Dave Breneman here is on the hopelessness of making accurate manpower projections. Allan Cartter made a very accurate projection of the academic labor markets well over 10 years ago. Of course, nobody listened to him and in retrospect it's obvious. It's a very simple type of projection to make. You look at a few demographic factors. You look at the supply of Ph.D.'s, and you find that by 1970 the supply will exceed the demand. I would again point something out. The demand for aircraft controllers will in the immediate future be based on the amount of air traffic. On the other hand, for many occupations we would have to assume greater difficulties in making accurate forecasts. Another usefulness then that I see in the policy simulation approach is that through experience we are accruing improvements in modeling the approach. You begin to identify those variables which have

impact upon specific occupations and to identify those occupations which are highly sensitive to changes in your assumptions, and you can identify those occupations which are not. It is useful to have an approach that the government planners, the President, or the Governor has available, a model which can predict the results of certain policies such as a crash national health insurance policy or energy independence or road building or what have you. It is also useful from the point of view of identifying those occupations which it may not be too difficult to forecast are relatively insensitive to even major changes in your assumptions, and identify those occupations which may be extremely difficult to forecast. You simply have to do the best you can year by year.

BRENEMAN: Just one quick comment. I would assume when you said "was it useful?", or was the forecast useful, you meant it in the sense "did they help somebody make the right decision after the fact?" It seems to me that is the only projection that somebody is willing to believe.

STEVENS: OK. We are now in adjournment for coffee, and we will reconvene in the four living room suites designated on your program agenda for an hour of "chewing" on the issues that have been raised today. Remember, we will not convene as a single body tomorrow. We have three concurrent sessions scheduled in the morning. The assigned topics are "collection and processing of employment data", "interpretation of employment projections", and "assessment of projections accuracy". These three topics will be repeated after the morning coffee break, so you can attend two of the three. Then, in the afternoon tomorrow, we will run concurrent workshops on three operating employment projections systems. We have chosen the Tennessee system which is operated through the RCU, the Utah system which is conducted through the Employment Service, and our own Missouri system which is subcontracted to the University. Again, these sessions will be repeated after a coffee break, so you can attend two of the three. Thank you.

(COFFEE BREAK)

Thursday, 3:45 P.M., July 10, 1975

[The give-and-take was so lively in the one-hour discussion sessions, that production of a verbatim transcript is impractical. Proper attribution of who said what cannot be achieved. Therefore, the approach taken is to cite the major issues raised (none were resolved!), in hopes that some readers will be introduced to concerns which they might not have considered otherwise. This does substantial injustice to the contributions made by some participants.]

Accuracy Assessment

The issue of employment projection accuracy was actively debated. One point of view which was expressed likened projection activities to guiding a projectile over an uneven terrain. At some points in time the projectile which is sent on a smooth trajectory, whether linear or non-linear, will be closer to the ground than at other times. Similarly, smooth extrapolations of past employment trends will be more "accurate" at one time than another. Now, the military has developed a computer-guided projectile which continuously alters its trajectory to home in on the target as long as the human agent sights the launcher on the target. The employment projection analogue of this would be a continuous readout which would incorporate the up-to-the-minute effects of all influencing factors. Obviously, this is not attainable. Four alternative procedures seemingly are available. First, one can despair of an ability to forecast future directions of economic activity, and resolve not to invest any part of a limited budget in projection activities. As several participants pointed out, this is no longer an available option, since universe of need and employment opportunity information is required for many types of funding approval. Second, one can react to substantial uncertainty about the course of future events, or lack of confidence in the design of particular projection techniques, by investing minimal resources in employment projection activities. This option clearly finds favor with many skeptical administrators and planners. Third, one can investigate the relative stability of each important (for the particular purpose at hand) sector, and subsequently invest more effort in monitoring the relatively less stable sectors and newly emerging sectors.

Finally, a fourth approach would be to engage in the policy-simulation exercise that Roger Bezdek described. In this case, one could alter assumptions at will and see what impact the change(s) have. The ensuing debate about the pros and cons of these options raised the twin issues of how accurate employment projections need to be, and what it is that is being projected.

The 'Need' For Accuracy

In one sense, if the projections have the desired effect, i.e. to influence administrative and student behavior, we can never know if the original projection was accurate or not. If the employment level at a given time is what was predicted five years earlier, does this mean the projection was 'right'? This question, in turn, raises the need to distinguish between a forecast--which is a best guess about what will happen in the future, and a projection--which is an "if---then" statement. The actual employment level and the previous projection may coincide even if the assumptions which underlie the projection do not hold. One can infer from such a phenomenon that the technique would not produce the same degree of accuracy under different circumstances except, again, by chance.

Several participants said that accuracy is determined by adversary action or inaction. You offer your projections and await the reaction of those who disagree. The non-believers are then encouraged to produce alternative projections, which can be compared with yours to determine why they differ and which is to be accepted as the basis for administrative action. Differences usually occur in the assumptions made, which is hard to convey to lay-readers.

Still other participants expressed the pessimistic view that accuracy doesn't matter, because administrative actions are really guided by political considerations largely independent of the future course of employment. This view was debated in the context of accountability measured, in part, by graduate placement. The mention of placement goals created a lively discussion of the appropriateness of using immediate placement as an outcome measure of the educational system. Mobility, particularly among youths, is extremely high. The first job may, or may not, be representative or indicative of future career directions.

The underlying tenor of the discussion seemed to decry the limited

applicability of fixed national and state data sources and techniques for state and local decision-making, while at the same time downplaying the actual use of projections in program approval actions. These views were not expressed without exception, of course.

What Is Being Projected?

Confusion abounded among participants as to what it is that we are, or should be, projecting. The terms "supply" and "demand" are loosely applied. Employment is the outcome of interacting supply and demand in an institutional setting. When we project future employment levels certain assumptions are made about each of these three factors. Typically, both the institutional setting and supply factors are assumed to be highly stable. 'Demand' is assumed to arise from growth (decline) in production, deaths and retirements. Job openings are presumed to arise out of these growth and replacement sources. It was noted, however, that most job vacancies--which must be distinguished from projected openings--arise from turnover; i.e., employees leaving one job to take another. None of the information systems incorporates this type of information because there is no systematic source of such data. This discussion led to consideration of the proper use(s) of employment projections. It was generally agreed that they are not intended for local job-placement counseling use, although a counselor might be guided by such projections in deciding which local firms to contact to generate employment opportunities for prospective graduates. Similarly, it was agreed that such projections might be used as one input for student decisions about curricular choice. But, it was noted, there are many sources of adaptation to a projected increase in employment and/or job openings. And further, one would want to know more about the conditions of employment in a particular endeavor. Among the thirty-one states represented some are more affected by in-migration than are other states. For that state this is an inexpensive source of skilled labor. Other states are more heavily influenced by substantial out-migration of graduates, which represents a costly drain on that state's educational resources. Few information systems even attempt to incorporate these flows for administrative use. Even within a given state, widely varying experiences were reported in attempts to monitor sources of skill-training other than public sector vocational education and CETA program categories. It was

acknowledged that most skill acquisition occurs outside these channels, yet it is very difficult to capture such flows in a regular manner. Another expressed view of "what is being projected" was that the subtleties of these concepts only tend to confuse most administrators, in which case they are most likely to revert to 'seat-of-the-pants' decisions rather than trying to master the correct use of the new terms. The essence of this view--"you're right, but..."--was debated with general agreement seemingly reached that during the interim there will be many abuses and quick-and-dirty adaptations of correct procedures, but that simultaneously a learning process will occur which will improve the capability to effectively adopt the employment projections as an important administrative tool.

Summary

The first day's formal program ended with general agreement that substantial duplication of effort, and repetition of needless procedural errors, is continuing but that this is inevitable given the historical circumstances of educational autonomy. It appears that recalcitrance in using the Bureau of Labor Statistics package via a state employment security agency derives as much from this source as from real needs for unavailable data. Indeed, there continues to be a limited amount of communication in many states between vocational educators and the producers of BLS statistics for that state. The latter charge the former with an inability, or unwillingness, to clearly articulate what is needed that is not now available. One strength of this conference was its bringing together of both vocational education and CETA people to discuss common information needs.

Friday, 9:00 A.M., July 11, 1975

[As was the case with the discussion groups Thursday afternoon, the transcripts of Friday's sessions do not lend themselves to verbatim reporting. Again, the editor has attempted to convey the substance of each session.]

Accuracy Analysis

Activities in three states dominated the initial discussion. Jim Harris reported on his experiences in Kansas prior to his recent move to Colorado. J. B. Morton described Oklahoma's current project which links accuracy and cost factors. And Garry Bice discussed Tennessee's activities in this area.

The major issue seemed to be how to resolve conflicts between the requirement that local education agencies (LEAs) submit justification data with program applications, and thinking that planning for employment opportunity should not be done for so small a geographical area. In each of the three states mentioned, LEA administrators are advised about employment projections in their own (usually multicounty) area and in other substate areas, as well as the state as a whole. Attempts to force local officials to not consider their own locale as a dominant factor have met with limited success because of other important interests which influence their behavior.

Jim Kane, from the Executive Office of Economic Affairs in Massachusetts described the work undertaken to develop a state economic model which would serve as a single information source for all state agencies. While this is a very costly undertaking with a long startup time during which no utilization is possible, it does allow for far greater consistency among planning bodies and promotes interdependencies which might not occur otherwise. Texas is engaged in similar activities. [Interested readers are urged to consult the participant registration list appended to these proceedings, and to contact the individuals mentioned for more specific guidance about the status of the issue cited.]

Data sources were explored briefly. The ready availability of 1970 Census of Population data was mentioned in the context of the tremendous amount of resistance to using it for planning purposes. It was also noted that for highly stable employment sectors, of which there are many, this is in fact a very reliable source. While there is almost universal skepticism about the usefulness of direct employer survey data, this source was acknowledged to continue in high regard at local levels. This arises, in part, from different objectives at the local and state levels, but numerous problems are created at both levels by attempts to reconcile information derived from such sources with data compiled in

other ways. There is apparently no readily available guidebook describing how to proceed in this regard.

The "accuracy" sessions failed to provide attendees with more than a hint as to how one should proceed in this area. This suggests either a lack of interest in accuracy--a view which some think describes the general administrative situation--or a rather primitive state of the accuracy assessment art. In either case, it was clear that no one state has achieved an exemplary approach that it is prepared to "sell" to others. It was agreed that the use to be made of data should define the investment to be made in accuracy assessment.

Interpreting Employment Projections

These sessions also addressed the accuracy issue, but from a different perspective. One participant stated the concern this way: "When a local vocational director takes it [BLS or Census data], he crosswalks it to an OE [U.S. Office of Education] code. If this has a plus or minus fifty percent accuracy we're lucky. So why in the hell worry about the accuracy at the front end unless we are going to worry about the accuracy of the crosswalk mechanism to keep that accuracy at the bottom end or at the easy end of it." The problem here, of course, is how to distribute Census occupations among more than one OE category. Concern was also expressed with how and when the Standard Occupational Classification system will be introduced. And now, a revision of the Dictionary of Occupational Titles is also underway.

The important issue of sources of pressure for detail and refinement which conference participants seemed to think was unwarranted was pursued. It was noted that an aggregation of the subparts of an information system which is useful for program planning purposes will indeed be a highly detailed system. Each program manager thinks that his or her own domain is of highest priority, and of course for them it is! Attempts to achieve uniformity for state and federal reporting purposes obviously conflict this perceived need for custom service. This tradeoff is not resolved once and for all, and is not pursued without friction. This is inevitable. It also appears that the trend is toward more uniformity for national reporting. There are no signs that this trend is likely to be reversed in the near future.

The tendency for data classification systems to be periodically

changed, for admittedly valid reasons, plays havoc with attempts to compile time-series of employment patterns.

The whole issue of interpretation was questioned. "What does interpretation mean? I was wondering how important that is in your activities?," one participant asked. Responses suggested that right now rather mechanical administrative treatment is accorded most projections, but that as real planning is more widely adopted, interpretation will become increasingly sophisticated.

One participant asked "...what are some of the strategies that other people are using to begin to get the local users in a psychological framework where they will accept these kinds of things and begin to use these in lieu of whatever else they've used before?" In response, Skip Yeager described the workshop series and Council functions established in Illinois precisely to accomplish liaison between statewide planning and local implementation.

A technician then questioned the propriety of planners essentially asking technicians to select the target groups and areas in which to offer training. What then are planners left to do? Is the operational program conducted largely independent of the planning document? Again, Skip Yeager referred to the attempt being made in Illinois to train local administrators so they will feel comfortable with data and its proper use(s).

Still another issue raised is the definition of technician responsibility to alert the user about all weaknesses. Since weakness depends, in part, on use this is not always easy to accomplish in a mechanical fashion. Another problem in the technician-user interface is that the technician knows the cost of supplying different types of information, but it is cumbersome to convey this to the user prior to preparation of a wish-list. In this context someone mentioned that some needs, like being able to respond to individual legislator's requests for information about their own district, establish a fixed base for disaggregation.

Another point which came up again and again was the importance of looking back, as well as ahead. Which decisions are in retrospect considered to have been poorly informed, and why? In this way, some insight can be gained about the role of information in decision-making. In this regard it was noted that the informational requirements to

terminate a program are much greater than those accompanying a request to introduce a new program.

One acquires a certain amount of frustration when reading the conference transcripts in the quiet repose of an academic office. The technicians clearly seem to be pleading to be specific in asking for information other than that which is available now. At the same time, the administrators seem to be trying to convey some sense of the complexities involved in doing that. It is clearly not a textbook case of establishing objectives which in turn define information needs. There is an education or manpower training system in place. Changes in size, location, or offerings affect many people and are not likely to be taken lightly. To know that an opportunity is available is not to say that it will be taken.

Data Collection and Processing

These sessions ranged over the entire spectrum of state systems represented. Rather than attempt to summarize this dialogue, the interested reader is referred to the contact people cited in the registration list appended for documentation of system content and procedure. The Center for Occupational Education at North Carolina State University in Raleigh, N.C., has subsequently inventoried all state systems and will be issuing publications which summarize this effort. Also, Joyce Shackett's paper is appended to these proceedings, in which she discusses a variety of data sources and the strengths and weaknesses of each.

Friday, 12:30 P.M., July 11, 1975

Illustrative State Employment Projection Activities

Missouri: The Missouri Occupational Training Information System (MOTIS):

[Editor's Note: Publications about the MOTIS are available from Dr. Glenn White, Director, RCU, State Department of Elementary and Secondary Education, P.O. Box 480, Jefferson City, MO 65101. When the transcript below refers to "we" it means the Human Resources Research Program, 217 Middlebush, University of Missouri, Columbia, MO 65201.]

Shackett: I'm just going to make some quick remarks about the MOTIS system. You all have a lot of documentation of our system, so you can take it away with you. I presume all of you who were interested were able to get copies of the three volumes, the white one, the orange one, and the beige one. In that white volume there is a schematic of the overall system, all the components of the system. But since the purpose of this particular conference is employment projection, I don't think we should really spend a substantial amount of time on the other components. You can read about the other elements in the system in those volumes.

We make a projection in terms of what an industry will have in terms of absolute numbers of workers at some future time period. Then we take these industry projections and convert them into occupational projections. Now this is the overall view, so now you're going to get some of the exact steps that go into it. The first thing we have to do is to find some reliable source of industry employment figures. And to do this we give a lot of consideration regarding what data sources are good for which industries for which areas. There is a paper called "Data Sources and Issues", which most of you probably have. This talks about the issues that are involved in choosing the correct data source for a given area for a given industry. So I'm not going to dwell on that here. Assume that we have chosen a series of data sources giving industry employment over a past time period. We take these sources for 13 areas within our state. (These are the Local Area Manpower Planning (LAMP) areas that were designated for us.) We project industry employment for up to 32 different industries, for each area of the state separately. We have 4 basic models. We use the procedure of ordinary least squares regression. I won't get into the statistics too deeply. For people who do know what I'm talking about, we have four basic models or functional forms--linear models and logrithmic models. We fit each model to the data we have for each area for each industry. It's all printed out with associated statistics, and then we go through each step by hand and pick out the best fit according to a number of different criteria. We check for significance in the results, for the goodness of fit, for auto-correlation, various other problems that occur, and we check most of all for the reasonableness of the figures.

If we find something that is very strange, then obviously we go back and check our data and find out what's wrong, why something looks unreasonable. What we eventually get is a set of industry projections. In other words, we have chosen our trends, and once we have our trends for each industry, then we project the industry's employment into the future for the designated number of years. In the orange volume that you have, these will be years between 1974 and 1980. We try to project an average figure for employment for the year that we're talking about. For 1974, it would be a figure for about the end of June, 1974. This, of course, is a smooth time trend, not considering seasonal adjustment factors. Now we have at this point figures for 1974 and for 1980, for each industry and for each area, and we have the problem that we want occupational projections, not industry projections. So we start the procedure of converting these into occupational growth and occupational employment. We use 1970 census data for Missouri to set up what we call a matrix. It lists for Missouri employment in 1970 by industry. Within each industry it lists all the occupations that are part of that industry. For example, we have construction being SIC industry 16 and it might say ten percent of this industry is made up of apprentice carpenters and it will continue for all of the listing of possible occupations and show how many, by percentage, belong in that industry. So this enables us to apply these ratios and convert each industry's employment into occupational employment. We also get from this matrix ratios that allow us to adjust our figures to include employees who were not considered before. Our basic employment by industry included only wage and salary workers. We then adjust these figures upwards to include self-employed, unpaid family workers, and government workers. Government workers are classified by industry into a special SIC category of 91, 92 or 93, (federal, state and local government). Many of these workers actually can be classified to another industry. For example, if an employee is being paid by the government when he is actually working on a construction project then we can classify him as a construction worker and by this procedure put him into his proper occupation. But we require all of these ratios to adjust for these factors. We now have occupational employment for 1974 and for 1980. Then we subtract 1974 from 1980, and we have a figure which we call the growth of employment for the time

period under consideration. Now we have a problem that there are what we call replacements that occur also for these occupations. There will be a number of workers who will retire, who will be killed either on the job or through other accidents, who will die natural deaths, or who will leave the labor market for child rearing or for other personal or family reasons. We acquire national figures, which are called separation rates that apply to specific groups of workers. We take the 1970 census matrix for Missouri, and we distribute our occupational employment by age and by sex ratios specific to Missouri for 1970, then we apply the national separation rates and get a figure for each occupation of how many people are expected to leave the labor force who will need to be replaced. Then we add the growth estimate to the replacement estimate and we have the figures for total projected job openings over the five year period. These are the basic two categories we use in projecting. Once we have these three things we're just about done. If you have a MOTIS volume, the orange volume, there's a table that will help you follow what I am going to say next. The three categories growth in the occupation, replacements, and total job openings are ranked. We have all of these occupations by census code. We then have a conversion of Census codes to the Office of Education codes. In the listing of our final output we have the OE code at the far left; underneath that we have the Census code. There are major Office of Education codes which are listed, such as 01 or 04. The minor code will have a digit to the right of the decimal point 01.01, 01.02, etc. What we do is rank the minor OE codes for each major code. In other words, each of the components of 01 will be ranked. We rank them in three categories according to growth, total replacements, and total job openings. So if 01.01 had a ranking of 2 in total job openings that would mean it had the second highest number of total job openings between 1974 and 1980. If it had a number 3 in replacements, that would mean it had the third highest number of replacements expected. It could have had a 2 again in total growth, meaning it had the second highest growth rate projected. And this is the basic procedure.

Question: You say you do break down Census codes?

Answer: Yes. Two quick comments about it. One, they are presented by OE code since the major purpose of this is for the State Department of

Education. So in terms of usefulness for CETA prime sponsors, there are intermediate steps that in some ways would be of more use to them. The geography of it, the selection of those thirteen substate areas, was to coincide with manpower planning data needs. The other point is, that for some counselling and immediate job placement sorts of uses this does not reflect, in any way, the job turnover phenomenon. We're not aware of any system that does reflect job turnover. So to talk about job openings projected, say, to 1981, it's very important to recognize that that only reflects the growth factor and estimated replacement needs due to retirements and other calculated withdrawals from the labor force. Although for some jobs clearly job turnover is the major source of job openings, and it's not replacement at all. Do any of you know a system that does incorporate job turnover information?

Answer: There's national figures on turnover rates.

Shackett: By industry. It's national, and it's by industry, and it would apply the turnover rates for a given industry to all the occupations in that industry. It's just worthless.

[Editor's note: The next section of the tape was too garbled to transcribe.] There are other sources which we may use in the future as a back up to check our other figures. There are various sources of agricultural data; crop reports, farm labor reports, and information on certain manufacturing industries.

Question: Of your three data sources, what was your basis for determining what is best for a particular industry?

Shackett: Basically, we got a lot of help from the write up that came with the basic sources. For example, unemployment insurance. They are very candid about what is a strong figure and what is a weak figure. They come right out and tell you they have weaknesses in transportation services, insurance and real estate, and their service industries, I believe. The problem with these being, of course, that they do not get employment for charitable or religious organizations, or for non-profit agencies, which hits very strongly in some of the insurance and service areas. And also, until 1972, they did not cover firms with fewer than four paid employees. So various industries that had a lot of employment concentrated in very small firms weren't fully covered up to that time. We compare these to other data sources, and choose whichever would be

the most appropriate data source.

Question: Joyce, since you figured '74 and '79 growth and replacement, do you go clear back to the Census now that you want to compute '75 and '80? Or are you going to stick to figures for '74 and '79 and project them?

Shackett: No, we update our series for the most recent data that has been collected. We go through the whole procedure again to take advantage of the new data and go back to the Census, and it all begins from scratch again. In addition, I would say that we have had very consistent results between the 1974 orange volume and the data that we have for our next volume. Surprisingly consistent.

Question: I was trying to find a fast way to do it. Could you give us some feel for what this has cost to develop?

Shackett: I can't separate the different components. You see, the problem is we're a subcontractor to the State Department of Education, and we subcontract on both the student accounting component which is the data processed through the schools about individual students enrolled in the programs (which is a major data processing activity), and the employment projections component. There is also a follow up component which involves using the computer to generate lists of students who should have graduated.

Question: The future will be more reasonable, you think?

Shackett: Computer programs are all developed. A lot of it becomes relatively routine. The problem with picking a dollar figure is that we have gone into other states where there are huge crews of people. Literally, you have been looking at about 3/4 of the people who have been associated with the MOTIS employment projections (three people).

Question: How long did it take you once you got started on it? To a state where you might be producing something?

Shackett: Well, we've been producing for three years now. Our third projections volume should be out within a month. [Editor's note: This volume is now available.] At first we had some thoughts on it that were, quite frankly, embarrassing. But it was good to have it out, because everyone looked at it and found errors for us, and we corrected them. By the time the orange volume came out, we were pretty conscious of what we had. We made some revisions in our orange volume and in our

upcoming volume, but not of a major nature. As of the second year, we were pretty well satisfied. We've had super support from the State Department. They have given us lots of autonomy in the areas where we need autonomy, and lots of support in the areas where we need support, and we enjoy a very good working relationship with the employment security people. And those three pieces which contribute to the overall effort aren't always there in some of the other states.

Question: Was part of the effort on the demand side supported through Glenn White's shop before it came out of OE?

Shackett: Yes, for example this conference, funded, in part, by Part C money, is really a small piece of the overall effort. We've been funded through the Missouri RCU for three years. The first year of that was funded through the Ozarks Regional Commission. The original developmental work was funded through the Ozarks Regional Commission on the MOTIS II operation. The original OTIS system in Oklahoma was supported by Ozarks. On the duplication of effort, people need not go back and go through all the painful steps that the MOTIS went through. A number of states now have worked the bugs out of various stages. On the other hand, we were asked, "are we cooperating with other states?" The answer is, not in a specific way. We know what Skip's doing over in Illinois. Jim Harris was here in Kansas until about a month ago. We know the OTIS system, and we know what the Iowa people are doing. But in terms of trying to begin to link systems together, that effort has not been made. I'd like to say that as far as standardization of procedures and moving towards those kinds of linkages, a lot of these systems are at that point and a lot of us better begin to think about that. Consider a state like Missouri, where three of our five SMSA's are on state borders and the two SMSA's that aren't are the smaller ones. For St. Louis and Kansas City we should be very closely involved with the Kansas people and very closely involved with Illinois. Are any of you involved in interstate linkages? We're not aware of any. Somebody was asking earlier about linkages between Alabama, Tennessee, and Oregon.

Question: To what extent do you think the decision-makers are using the information which you generate, in terms of real hard decision-making, at the national, district, or local level? And what are we going to do about the business of prognostication as opposed to just

simple projections? Your system is relatively simple, all you have to do is find out what these occupations have been doing and extend the line. Is there any effort in trying to determine new and emerging occupations? We have to work on this problem of trying to see ahead. And I'll wager that in your book you show nothing but minus figures in terms of agricultural production, because that's been the history, but with an emerging energy crisis it doesn't take a very good weather forecaster to predict rain when it's raining, but it takes a strong man to predict rain when the sun is shining. We may just have agriculture in the greatest demand among all occupations if we go back to horses and mules.

Shackett: In Missouri, agricultural production isn't minus because we have basically an old labor force. The new emerging occupations are those for which you cannot do trend analysis. There isn't any history, therefore, you can't project. My immediate response would be that this is something that we haven't subcontracted to do. Obviously the State Department of Education needs to be concerned about it. We do get those types of requests, and we do have some insights that we can give them to help. In terms of the decision-making use of this, yes, the system is at the point now where the State Department is going to be using this information. Kay Raithel is a staff member on the State Advisory Council, and she was making the point that if you sat down with the program directors and said, "here is what these tables say; it is one tool in the overall process...," you might have some impact. Right now, I would say that it is on the threshold of being the major source of information for state planning. Not, however, at the local level, but we have gone out and dealt with the local school officials in the last two years and referred them to the volume, and dealt with some conceptual issues with them. They are beginning to become familiar with it. The next step would be working with them on a week-to-week basis. I would say that teachers' response to the MOTIS is exactly the response Mark Sanders gave. They really feel that they have a better gut feel for their area than this data represents, so they're much more prepared to operate on their gut feelings at this point. It's a matter of increasing their confidence if it is warranted.

Question: Do you think that B. W. Robinson and staff, who you say have

accepted it as far as state planning is concerned, can change this gut feeling through a series of in-service workshops?

Shackett: Yes, I think so as far as service is concerned, but more particularly where a decision has to be made, a resource allocation decision. B. W. goes into the meeting with the MOTIS information, and the people come in with their gut feeling and if the MOTIS information is sustained as the better source to make the decision, then you are over the hump in credibility. But if the gut feeling turns out to be more appropriate, then it's warranted, and that happens on occasion.

Stevens: There is a suspicion about this. I was working with Paul Braden back when he was developing OTIS and he had strong feelings about the area skill survey. You heard his comments about that yesterday. When we go out and talk to local school officials, they want to continue to do area skill surveys. They have what I call a warm feeling about direct contact with employers and a huge suspicion about University computers. That has to be overcome. We have a medium concern about University computers.

Question: How does this methodology that you described compare with the OES program?

Shackett: Missouri is an OES state, one of 29, and the first state OES publication is about to come out. But they did the manufacturing survey, I believe, three years ago and they're just getting that data out in public form now. We're now at the point where we can take that OES information and compare it, not on a one-to-one basis, because there are all kinds of problems of definition, and so on, but it's another kind of tool which can be used. Someone will have to sit down and, it would be helpful, write a manual for telling area school people how to use these tools. The OES data are not fed in a direct sense into our system. But right now, Tom Righthouse is Missouri's research and analysis man. He knows exactly what we're doing and we know what he's doing.

Question: How about the SOC? What about when Weinstein puts that up? The 1980 Census will be in the standard occupational classification code he says. I don't think that's outside the realm of possibility. Well, 1980 may be a little close, so they may not have it worked out by then. I can certainly see a lot of mandating in federal programs to use the standard occupational classification program. States that are

developing their own classifications and expending lots of resources on that better keep their ear to the ground. This raises the very important issue of multi-purpose systems. What are the costs incurred, costs in terms of being unable to get the information you want from having a single purpose classification scheme. Can you meet what the Census is supposed to be doing, and BLS is supposed to be doing, and the prime sponsors and education agencies, even local school officials and state planners with a single classification system? You mentioned something about Occupational Information System (OIS) grants that seven different states have, can you tell us something about this?

Answer: Okay, there are eight states and I can't name them, but they have just gotten grants from the Department of Labor, which is $100,000 a year for each of three years. There was an original RFP out for all states to respond and then some were invited to write proposals from that original group. The eight were funded in the last month. Those eight are Ohio, Alabama, Michigan, Oregon, Colorado, Wisconsin, Massachusetts, and Minnesota. The purpose of those as I understand it, again, is that they are a little farther down the road in cooperation among agencies doing similar sorts of things. It's to get the education agency and economic development agency and employment security and those state agencies that are involved in related activities to cooperate in getting information. The key is to provide the information to students for counseling, it is career education oriented. As I understand it, in the OIS the emphasis is on occupational information skill information, job requirements, etc., rather than projections.

Question: I'm trying to figure out what is the relationship between all these OIS systems and MOTIS and what is going on in the Department of Labor?

Answer: A big misunderstanding that still exists in the state of Missouri is what is the purpose of MOTIS? Many people do feel that they should be able to pick that book up, open it, and give advice to a particular student sitting across the desk about where to go look for a job, and that's something we still have to work at--to indicate what the limitations are.

Roskam: In regards to certification requirements and that kind of stuff, we tried to get as much information on that as we could a couple

of years ago for MOTIS because it become apparent to us that any occupational classification system in existence didn't give us enough information to convert well into the USOE program instructional codes. So we went around and mailed out things, talked to people and developed descriptions of structural problems in the labor market and barriers to entry, and descriptions of different types of things that people had to be able to do to get into various occupations. We made an attempt to augment the Census occupational classification system and to augment the DOT, and various others that we were using, trying to get a fix on how the USOE classifications hooked into classifications that actually had data attached to them that we could use. The problem, of course, is that you want to know your training needs in the USOE categories, but all the data turn up in other categories and you have to convert. The best descriptive information is in the DOT, probably, as to what occupations really entail, and they don't have any data in regards to how many people are in, or have been in those particular occupations; they simply have descriptions.

Question: Did you have success, though?

Roskam: We don't know. That's one of the big problems. We don't know how good the MOTIS is. We did succeed in devising a fairly consistent system whereby we can come up with numbers in USOE categories. We can describe the system, we can describe our methodology. As far as generating the OIS types of information, that is a real hard road. To come up with barriers to entry information, licensing information, and so on. It's around, but it's very diffuse and hard to get a handle on. I'll tell you, I have come to the tentative conclusion that multi-purpose classification systems are basically misleading, and I think that standard occupational classification probably has a place. But if it is to be used for a variety of things, then it's going to be in trouble. My work lately has been an attempt to delineate the various sorts of characteristics or features that a classification system, that would be particularly useful for vocational education planning, would have. Then I have evaluated several of the existing systems, including DOT, Census, and what I knew about where SOC was going, and made statements about how close they are to actually having these desirable features and none of them get very close. I've gone ahead and tried to develop some

kind of conceptual structure for how we might start getting a better idea of how close these systems are, or how we might go ahead and try to improve on one of our own. I think we're in a fairly primitive state. What I'd like to ask is what is an occupation. I'm not really sure I know. I know what a job is, it's what you have to do to get paid, but I'm not sure what an occupation is.
[Editor's Note: This is the end of the recorded portion of this session.]

Tennessee:

[Editor's Note: The presentation was made by Garry Bice, RCU, 909 Mountcastle Street, University of Tennessee, Knoxville, TN 37916.]
Bice: I don't understand exactly what it is that makes our system contemporary, according to the program, but maybe that was just to encourage us to come to this conference.

We'll tell you what we're doing in terms of projection, and hopefully, that will give you some insight. Jerri Smith is working with us in the area of projections. She's my right hand person.

We brought some stuff with us to show you basically how we got started. We try to differentiate between manpower projections and manpower forecasts. We are not forecasters. Just like the weatherman, we can't tell what's going to happen. So our projections are based on trend lines in the past, historical growth and decline in various occupational areas. We didn't go out and gather additional data, except to a very small degree to check out things. We wanted to have the human factor still there. We wanted to make some judgements based upon what the human brain says, not strictly upon what the computer says. We took the data that were available. Now those data came from a number of sources. They happen to be the same data that the State Department of Planning uses. We have seven agencies that were on originally: health, economics, community development, higher education, vocational education, the department of education separate from voc ed, and welfare. They all sat down and agreed that there would be one agency that would be responsible for manpower projections in the state. Now they

were responsible for it, but they used data from several of the other agencies involved. But economic and community development was to come out with the final figures. If anybody wanted to make a federal application or any application, they could use economic and community development's projections. It was agreed upon and they didn't have any projections, so they came to us for the data that we had. We think that there's some validity to it.

Question: It still goes under their name?

Bice: Yeah.

Question: To the other agencies?

Bice: Right, which I think is real fine. It has more impact that way.

What we have done is we have started from the basic population figures, the Census figures. I know there are fallacies there; that's what everybody says. But they haven't told me what the real problems are. We have projected population, you can't have more people working in the state than you have population, except for the people you have migrating across the border. We can't have 4½ million working with a total population of only 4 million. We have about 1.8 million in the work force. So the total labor force in the state--let me get those current figures...the total work force cannot be 4 million, because our labor force is only 1.8 million. Our work force would include all the people coming in, but twice as many people don't come in to work as live there. So that's where our human factors come in; we know that's not accurate. So we had to do away with the original projections. We started with the population, we took birth rates, we took number of people in school, we took county by county population, school district by school district population, grade levels.

We got hold of the list of all the employers in the state, and this again was very helpful. All employers that made any contribution to workmen's compensation. I know there's some problems there, because all employers and their workers aren't covered by workmen's compensation, but most of them are. That contingency consisted of about 65,451 employers and 1.4 million employees. So 1.4 million out of 1.8 with 300,000 of that other 400,000 employed by government. Really, the data cover most of the total labor force. We asked them what their projections were for employment. We did two things. We got an historical

pattern from '68 to '73, the time we did the survey, and then we asked for their projections for '78. Now, I know there are fallacies there, because an employer who may be filing for bankruptcy will also at the same time predict expansion. We'll have that occasionally.

Question: You said you asked for a projection for '78. Was that an annual projection until '78, or just one projection?

Bice: No, a one time projection for '78. They don't know if they're going to get this guy employed in December of '76 or January of '77. We could have put it in a different year and yet still we're going to find this. So we only asked for a five-year projection.

We used USOE code. The 110 that are required by USOE reports, and again our problem is that of 33,000 jobs available, down to 110 reported to the USOE, down to 6 major program areas. You can see where some of our problem is.

We sent them a list of occupations, and asked them to give us a list of their past employment. You'd be amazed at the number of employers that predicted new and emerging job titles. Some of them had no employees in '68 or '73 in some categories, but they were projecting a development of new job titles by '78. We got a lot of that. I was really surprised. And this, by the way, was coded, so we had a common basis for whatever the employment was, not who the people were, but what the employment opportunities were going to be. OK, then we put that with the projected population figures that we took from the center for business and economic research, which had birth rate, death rate, migration factors, everything. I don't really know all of their factors, that's one of the problems here, but it's the figures used for statewide planning. The last time they checked, and they do some annual checking on a year-to-year basis on different counties, population and otherwise, they were within .1 percent on population. We figured that was close enough. We can then live by that. We put a lot of faith in what they're doing. The other thing is that we have the Tennessee Valley Authority which in itself employs 18,000 people. They spend as much on education in a year as the state does. A lot of people don't realize that. They buy more fertilizer, for example, than all the rest of the farmers put together. Because of the magnitude of their operation, they also have a manpower section. They've been studying the

impact of nuclear breeders. Jerri can correct me if I'm wrong, because she's been working on it. The next project is 1.8 billion. So they've done a lot of studies about where the manpower is, where it might come from, and its impact on the economy. Now when TVA moves in and starts to build a dam, they have to do all kinds of environmental studies and so forth, and build a whole new city and take a look at all the factors. They've got a lot more power behind those kind of studies than we do, either at the state government level or in vocational education or the department of education. And we do work closely with them. As a matter of fact, we do a lot of special things for TVA. We don't necessarily agree with them on their projections or their processes, but we're familiar with them...

Then those figures are put together with separation rates. Again, studies that have been done basically by TVA, because TVA and our Center for Business and Economic Research is concerned about the impact on a community. We put our separation rates with the population rates and expected expansion rates and do a straight line projection on that basis. Now, we're not forecasting, we're projecting. Again we had to collapse some categories for planning purposes. It comes out on a little program like this. We do it on a county by county basis. This happens to be a development district basis, of which there are eight in the state. That's probably as close as we can come to projection needs in our state. And these same figures are used by our agencies.

Now, what happens is we go to the local administrator. He says, "Those figures are wrong. Let's come up with some better data." We say, "if you've got more accurate data, you just plug it right in here on the computer tape and we'll do it for you." If the local system wants to do something, we can give them a grant to do it. If they say, we don't believe your figures, we say good, do one of your own. Here are the parameters with which to work. When you get the updated data and you've used it, then send us the updated information. And you'll have updated information, and we'll have updated information. But don't tell us it's wrong, unless you have more accurate data. They initially started with a little thing we call a data pack. We did this originally back in '72, but it was printed in '73. And we have one of these for each of the counties in the state, 95. What we put in was school

dropout rates, unemployment rates, county and state-wide. We work with a concept called the work shed area. Here's Hardin County which is down in that part of Tennessee, and that heavy outline area indicates where the people who live in that county work. So this opens the local director's eyes. All of these people work in Knox County, which is a metropolitan area. ... All the woodworking people drive 50 miles to work. They don't believe that until they take a look at it. We have population figures, we have trends and compare them with the state figures. The comparisons there were forecast over a period of time. You can see what actually was happening in '70 and '71, and where they are now to find out if an occupational area has increased or decreased. We give them one figure.

Question: How many school districts do you have?

Bice: We have 145 school districts, but that's a little misleading. There are 121 secondary school systems in the state. We have one county with a population of less than 6,000 that has eight school systems. Seven of them are elementary and one high school system. We've also got another school system in Raytown which has a county population of 5,000.

We can't spend the time and money to go out and gather data, whereas our Center for Business and Economic Research, which is responsible of keeping track of kilowatt hours of electricity, bank deposits, etc. They keep all of this data. So we think we're pretty accurate. The last year that we checked population figures we were not very far off. Our school enrollment figures, by the way, were more accurate than the state Department of Education figures when they made some kind of projection.

[Editor's Note: This is the end of the recorded portion of this session.]

Utah:

[The presentation was made by Richard Brown, Labor Economist, Department of Employment Security, 174 Social Hall Avenue, Salt Lake City, Utah 84111.]

If you don't mind I'll just start out describing essentially our philosophy of providing information and talk a little bit about our new project. One of the five major services of the Utah agency is to provide appropriate industrial and occupational manpower information. We have a basic philosophy that is essentially that we will attempt to maximize the use of all the talent and expertise and experience that we have to provide the best possible information in the shortest possible time frame. And that means that the data systems we come up with will have to be a sensible size and scope and yet will still be responsive to user needs. And it has to be appropriate, of course. Now we have conceptualized the system we would like to have, and we visualize it as having certain parts and the parts are fairly traditional and most of you have probably found your states to be similar. It does include a supply component as well as a demand component. We have been providing data to our users for--well let's see, I've been involved for ten years now, so I would say since 1965 or 1966 we have actively provided occupational projection information. We began before the Occupational Employment Statistics program came into existence, and we were somewhat fortunate that when the Federal people were considering creating this experimental OES program they asked us if we could perhaps share some of our experience with them. So we are an OES state. We do things a little bit differently, not in the traditional OES manner. Our system essentially consists of this. We conduct establishment surveys to determine what the occupational employment patterns are. We take these patterns to make current estimates of occupational employment by industry, not with the idea of publishing industrial information but with the idea of aggregating those occupational employment levels across all industries, and providing an all-industry type of estimate. Once we have estimated the occupational employment in total for the non-agricultural wage and salary sector--we have this whole area of self-employed and agricultural workers who are not picked up in an establishment type survey. We can't provide estimates for these totals, and those are based largely on Census materials; largely based on methodologies that the BLS has worked out. So, then we make estimates for those classes of workers, wage and salary, government, and so on; we also make projections of those for future years. We make projections

actually by industry of all those sectors, and then use the occupational patterns we have obtained from establishment surveys and from Census-based material to distribute the occupational employment for the projection period. We prefer to have it in terms of several alternative projections for a given target year--least probable, most probable, whatever those are. To that we have to add an estimate of occupational replacement for those who die, retire or leave the labor force. Now, of course, when you make a projection of employment for the future, the difference between the current period and the target year is your expansion of employment, but we do know that replacement employment is equally if not more important in terms of the total number of job opportunities that do occur, or are created during the target period. Then to this, we want to start looking ... this will give us the demand side. All the talk you've been hearing about the OES program and its relation to producing demand projections, has focused on this business of conducting establishment surveys, and you can see that it's not the entire picture. Now if you were to read the description of what the OES program is to include it includes all of this; but if you were to look at where the emphasis is now, you would see that it is on collecting data from establishments, which is only part of the data which is needed and there is another aspect ... The interindustry matrix phase is supposed to include a methodology for estimating self-employed and agricultural workers. So, we're getting into this and we're not waiting for the specific methodology and specific programs that the Bureau of Labor Statistics is putting together, although when they're ready we'll be very anxious to use them. We're following this philosophy conceptually, but our methodology differs.

We also have not gotten into the supply end of it too much, but we are going to collect and estimate data for supply. We don't know for sure where we're going on this. We can anticipate some of the problems in trying to match things up. We know that projecting the supply is going to be difficult and that there are a dozen different supply sources, and it has a certain number of complications associated with it.

One part of our system involves developmental research. We are trying to know a lot of things that vocational educators would like to

know, that prime sponsors would like to know, and that the BLS doesn't know. So we're trying to find out what we can at the state level about some of these labor market transactions and processes that we don't know very much about. The particular research project I'll talk about touches on this. Our publications ... I have not personally worked with the prime sponsor people, but data does go to them. Now we are publishing presently, and our publications are straightforward; we haven't developed that state of the art yet. We just hit people with the hard data. We don't have a lot of narrative or a lot of analysis. We do describe our methodology briefly, but the data that is asked for by vocational educators is presented by the instructional programs and the OE codes. We provide employment estimates for each of the instructional programs. We also provide estimates of the new and replacement job opportunities that are anticipated for the target period. We provide it statewide and we also provide it for the planning districts in the state. We have eight of them in Utah. This particular information gets better each year because we have more basic data that we're able to work with, more comprehensive, more accurate, and our staff gets more sophisticated and so forth. We publish data that's not the best possible, but it's the best we can do in the time-frame we're working with.

The whole idea of making projections for use in determining training programs is very puzzling to us. One of the things that puzzles us is that vocational educators feel that they train people for entry-type jobs. And this particular projection methodology doesn't really get to entry-type jobs. It focuses on an "all jobs" concept. We know that there are certain jobs you really don't have access to if you are a young person just entering the labor market. You've got to get into a firm at some entry level and there are certain jobs that you're promoted to, or you're transferred to once you get a foothold. The methodologies that are in popular use today--the OES and so forth--don't take this into account. They make estimates of replacement needs for occupations that people are promoted to, so that the average graduate of a voc-tech school doesn't have access to those jobs. So we have been looking into this, and we have what we consider to be a fortuitous occurrance. We have some 25,000 employers in Utah. We have 420,000

people employed. These 25,000 employers are required to report to us quarterly their total employment. This total employment information that comes to us is similar to what is found in most other states. It is called the 202. Ours is less limiting. By 202 I mean data that comes from establishments and is covered under the Unemployment Insurance tax. There are also other establishments that do not report under UI auspices. In Utah these firms also report to us, not on a mandatory basis but on a voluntary basis. They have been doing so for years. This mandatory reporting system is really the backbone of the employment statistics program in this state. You don't hear much about it. But it is the industry employment information that is the basis for most of the projections which are made through the Employment Security system. The reason why the Employment Security system has been designated as the agency to provide this type of information is because theoretically the Employment Security people have a list of all the employers in the state, or at least a good portion of the employers. They know what the size of firm is, they know what industry they're in, and it is this particular data base that we're going to be dealing with in our research project. The welfare people in Utah have become rather concerned that there are a large number of fraudulent claims for welfare, so they have made an arrangement with Employment Security for Employment Security to require on these report forms which we get quarterly from employers a list of all of the people that they hire and their social security number. In other words, the name of the individual, the social security number, and date hired. They are thinking that if they can get these social security numbers of the people hired in the state, they can match them up with the social security numbers of the people who are claiming benefits--not only welfare but unemployment insurance benefits..... When we heard they were going to do this for one or two quarters of 1975 we hurriedly asked them if we couldn't find out the occupational title of these hires being reported. They agreed to do this. We are proposing to take this data once we get it, and what we plan to do, even though we have 25,000 reports with this hiring information on it; we'd like to take a sample of these reports--maybe three or four thousand of them, the same employers who have reported to us via the OES program and find out which occupations they hire people for. In other words, get a

hiring profile by industry which we can not only match up with the OES employment profiles to determine if there are any differences in the hiring patterns of the employers related to their total employment profiles, to identify entry level occupations, to see if we couldn't do something with occupational accession rates, i.e., find out what proportion of the total employment in an occupation seems to be turning over ..., also to find out what penetration rate the Employment Service has of total jobs. Now, we do have some preliminary information that is based on another aspect of this reporting system we have with employers. For some ten years now, in addition to requiring employers in Utah to report the number of people employed, we have also required them to report the total number of new hires, and there are approximately 240,000-250,000 new hires which have been reported annually. This is from an employment base of about 430,000. There is a considerable amount of activity in that labor market. These probably aren't just new hires. They are probably not net hires; net hires being those who are hired for the first time, recalls after being laid off. They may have been seasonally laid off and then returned. We suspect that this is a gross count of hires, which will closely approximate what we're going to get occupationally speaking when we total all of this stuff up from our ... Now that's 70,000 new hires per quarter, or total hires per quarter. We feel that if we can get a fix so that we can make an estimate of the occupational distribution of these hires, that with this information supplementing the information from the OES program that we've got another dimension to the whole area of making projections that will let us make better short-run estimates.

I'm not trying to convince you that we're doing anything really tremendous, that the procedure that we use is the way to go. I throw this out because I understood one of the things I should do is promote a dialogue here. Would anyone like to offer a few observations or comments? [Comments not intelligible on tape.]

STEVENS: There is no formal synthesis of our sessions. Each of us takes away a better appreciation of the context in which our own

efforts are developing. There is much to be done, but there is also much duplication of effort already occurring. Perhaps the communication channels established in the past two days will contribute to a reduction in duplication and a frontal assault on the unknown.

APPENDIX I: CONFERENCE AGENDA

A NATIONAL WORKSHOP - CONFERENCE

OCCUPATIONAL EMPLOYMENT PROJECTIONS
FOR PROGRAM PLANNING PURPOSES: ISSUES AND EXAMPLES

DATES:	July 10 and 11, 1975
LOCATION:	The Breech Training Academy Overland Park, Kansas (a Kansas City suburb)
SPONSORED BY:	The Human Resources Research Program University of Missouri-Columbia [Through the auspices of a Part C grant from the Division of Research and Demonstration, Bureau of Occupational and Adult Education, U.S. Office of Education]
IN COOPERATION WITH:	The Bureau of Occupational and Adult Education, U.S. Office of Education HEW--Region VII and The Manpower Administration, U.S. Department of Labor--Region VII

THURSDAY, JULY 10

MORNING

8:00 - 8:30	REGISTRATION
8:30 - 8:45	INTRODUCTION - DAVID W. STEVENS, DIRECTOR HUMAN RESOURCES RESEARCH PROGRAM UNIVERSITY OF MISSOURI-COLUMBIA
8:45 - 9:45	"WHY COOPERATION IN PLANNING?" WILLIAM RILEY OFFICE OF MANPOWER OFFICE OF THE SECRETARY HEW ED O'DONNELL WEYMOUTH, MASSACHUSETTS
9:45 - 10:00	"A VOCATIONAL EDUCATOR'S VIEWS ON EMPLOYMENT PROJECTIONS IN PLANNING" FRANK DRAKE, COORDINATOR OF VOCATIONAL EDUCATION DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION JEFFERSON CITY, MISSOURI
10:00 - 10:15	"A MANPOWER PROGRAM ADMINISTRATOR'S VIEWS ON EMPLOYMENT PROJECTIONS IN PLANNING" MARK SANDERS, DIRECTOR STATE MANPOWER PLANNING OFFICE SACRAMENTO, CALIFORNIA
10:15 - 10:30	COFFEE
10:30 - 10:50	"THE STANDARD OCCUPATIONAL CLASSIFICATION SYSTEM: A FUTURE ISSUE IN PLANNING" EMANUEL WEINSTEIN BUREAU OF LABOR STATISTICS WASHINGTON, D.C.
10:50 - 11:10	"CHANGING OCCUPATIONAL REQUIREMENTS" LEONARD LECHT THE CONFERENCE BOARD NEW YORK, N.Y.

11:10 - 11:30 REACTORS TO A.M. SESSION

ROBERT MORGAN--NORTH CAROLINA STATE UNIVERSITY
JOYCE SHACKETT--UNIVERSITY OF MISSOURI-COLUMBIA
ALAN WILLIAMS--MASSEY UNIVERSITY, NEW ZEALAND

11:30 - 12:00 OPEN DISCUSSION

12:00 - 1:30 LUNCH

AFTERNOON

1:30 - 2:00 "THE BLS EMPLOYMENT PROJECTIONS PROGRAM"

RICHARD DEMPSEY
BUREAU OF LABOR STATISTICS
WASHINGTON, D.C.

2:00 - 2:30 "THE ROLE OF DIRECT EMPLOYER CONTACT"

PAUL BRADEN, ASSISTANT COMMISSIONER
RESEARCH, EVALUATION AND PLANNING
DEPARTMENT OF ECONOMIC AND COMMUNITY DEVELOPMENT
NASHVILLE, TENNESSEE

2:30 - 3:30 ROUNDTABLE OF REACTORS

1. ROGER BEZDEK, CHIEF
   INDUSTRY GNP BRANCH
   U.S. DEPARTMENT OF COMMERCE
   BUREAU OF ECONOMIC ANALYSIS
   WASHINGTON, D.C.

2. DAVID BRENEMAN, SENIOR FELLOW
   IN ECONOMIC STUDIES
   THE BROOKINGS INSTITUTION
   WASHINGTON, D.C.

3. CAROLYN CALLAHAN
   INFORMATION AND PLANNING ANALYST
   BROWARD COUNTY MANPOWER COUNCIL
   FT. LAUDERDALE, FLORIDA

4. JAMES HARRIS
   MANAGEMENT INFORMATION SUPERVISOR
   STATE BOARD FOR COMMUNITY COLLEGE AND OCCUPATIONAL EDUCATION
   DENVER, COLORADO

5. HARVEY SOKOLOW, DIRECTOR OF RESEARCH
WISCONSIN MANPOWER PLANNING COUNCIL
MADISON, WISCONSIN

3:30 - 3:45 COFFEE

3:45 - 4:45 OPEN DISCUSSION IN LIVING ROOMS: A - 11
A - 12
A - 15
A - 23

FRIDAY, JULY 11

MORNING

- 9:00 CALISTHENICS

9:00 - 10:00 CONCURRENT SMALL GROUP SESSIONS:
(Thursday's presentors as resource people)

I. COLLECTION AND PROCESSING OF EMPLOYMENT DATA
II. INTERPRETATION OF EMPLOYMENT PROJECTIONS
III. ASSESSMENT OF PROJECTIONS ACCURACY

10:00 - 10:30 COFFEE

10:30 - 11:30 REPEAT OF CONCURRENT SESSION I, II, III.
(so each person can attend two of the three small group exchanges)

11:30 - 12:30 LUNCH

AFTERNOON

12:30 - 1:30 CONCURRENT SMALL GROUP SESSIONS:

IV. AN EXEMPLARY EMPLOYMENT PROJECTIONS APPROACH--
UNIVERSITY - STATE AGENCIES
(MISSOURI)
V. AN EXEMPLARY EMPLOYMENT PROJECTIONS APPROACH--
EMPLOYMENT SERVICE (UTAH)
VI. AN EXEMPLARY EMPLOYMENT PROJECTIONS APPROACH--
RCU (TENNESSEE)

1:30 - 1:45	BREAK
1:45 - 2:45	REPEAT OF CONCURRENT SESSION IV, V, AND VI
2:45 - 3:00	WRAP-UP AND ADJOURNMENT

APPENDIX II: REGISTRANTS

OCCUPATIONAL EMPLOYMENT PROJECTIONS
FOR PROGRAM PLANNING PURPOSES:
ISSUES AND EXAMPLES

A WORKSHOP/CONFERENCE HELD JULY 10 AND 11, 1975
AT THE TWA BREECH TRAINING ACADEMY
OVERLAND PARK, KANSAS

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APPENDIX III: BACKGROUND PAPERS

DATA SOURCES AND ISSUES

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DATA ISSUES

Introduction

Projecting the future employment level and mix for educational planning purposes involves extrapolating industry employment trends, and then converting these industry projections into their occupational components. The decennial Census of Population includes a breakdown of each industry's employment into its occupational composition for each state. While not all industry or occupational categories are represented for a given state in a particular Census year, the 1970 Census industry-occupation matrix allows for 228 industry designations and 442 occupations. These designations differ across Census years also. These occupational percentages can be applied to projected industry private wage and salary employment to obtain projected occupational employment.

Using additional data from the state Census reports, private wage and salary employment by industry can be adjusted to include 1) self-employed, 2) unpaid family workers, and 3) government employment for each occupation in each industry. Adjusted occupational employment can then be summed across all relevant industries to get total projected employment in each occupation.

The starting point in projecting future employment trends is collecting good data on private wage and salary employment by industry for previous points in time. Various factors must be considered in selection of a data source. These factors, which have been discussed in a more general context previously, are:

1. geographic aggregation
2. industry classification
3. historical time period for employment data series
4. frequency of data observations

Geographic Aggregation

There are a greater number of reliable data sources for statewide employment than employment by county, so geographical aggregation must be carefully considered in the context of the use(s) to be made of the projections. Another consideration is that the larger the geographic unit chosen as an employment base, the more stable will be

the employment paths projected. Finally, if a geographic region includes territory in two or more states, it may be difficult to find a data source presenting exactly the same listing of industrial detail for all of the states included.

Industry Detail

Another factor to be considered with regard to the use(s) to be made of the output is the level of industrial detail chosen. Industries are classified under the Standard Industrial Classification (SIC) system. The coding is numerical, with an increase in the level of industrial detail signified by an increase in the number of digits in the code.

Major industries have a 2 digit code. Each major industry is divided into more detailed industry components with 3 digit codes. In addition, each 3 digit industry component is classified into still more finely detailed industry elements with 4 digit codes. Finally, groups of related 2 digit industries are aggregated to form divisions. For example, mining is a division formed of the codes 10 - 14. In this division, SIC 10 is metal mining. SIC 104 is gold and silver ores, while SIC 1042 is lode gold.

Generally, more data have been collected for the broader levels of industry detail than for fine detail. For 3 or 4 digit industries, data sources are very scarce. Usually the choice must be made between 2 digit or divisional detail in developing employment trends.

An SIC division may provide a more stable employment trend than its 2 digit components could provide separately. However, valuable information may be obtained by projecting the components, especially if any component has an occupational distribution significantly different from the occupational breakout for the entire division. In this case, if all the industrial components of the division are not following the same growth path over time, projecting SIC division employment and then converting to occupational employment might give significantly different results than projections for each component separately would generate. Projecting the components separately would yield the more accurate estimate of future occupational employment. To summarize, it is best to project components of a division rather than the division itself when the components have differing occupational

breakout patterns and are following different growth paths. This is likely to occur in a division such as "Manufacturing", SIC 19 - 39.

Time Period Covered

The selection of a time period to use in developing the industry-occupation employment trend is critical. In general, it is good to have a relatively long time period so as to establish a reliable projection trend. However, if the period is too long it may encompass a growth trend that has become obsolete. Too short a time period may yield unreliable projections due to insufficient data to establish a trend. It is possible that different time periods may be appropriate for different industries in developing possible future growth paths in employment.

Frequencies of Observations

The desired frequency of observations must also be selected. This generally ranges from monthly employment to yearly average employment. Within a given time period, monthly data can yield a high number of observations, which is statistically preferable. However, increasing the frequency of observations may also introduce serial correlation, which would produce unreliable estimates unless certain adjustment procedures are applied. Also, some figures for annual employment are averages of monthly or quarterly data, while others are taken for a specific point in time during that year. For example, the County Business Patterns employment series represents data collected once a year for a pay period centered in March. Care must be taken when using data that may not reflect or adequately represent actual average yearly employment, remembering that the purpose of the projection activity is to generate information for educational planning.

These factors, among others, must be considered when choosing a data source. The critical issue is that there is always a trade-off problem. Each data source offers a unique combination of industrial detail, observational time spans, geographical area of coverage, and so on. For example, a source revealing 3 digit SIC employment may be computed only at the state-wide level. Another source may have 2 digit SIC employment detail by county, but be available only for a short time period. The relative merits of the various data sources must be examined to find the best data choices for one's specific goals.

In addition, once a data source is chosen, it should be examined for defects. It may have areas of built-in weakness (e.g., poorly covered industries or incomplete firm coverage) which may or may not be specified by the presentation accompanying the data. In addition, there may be problems due to improper collection procedures. Suppose we have several data sources which allegedly present the same data, developed by differing collection and estimation procedures. If the figures differ for specific industries, then only one data source is closest to being correct for the instance being checked. How to determine which source is best for one's own purpose is a difficult decision. Some guidelines may be found by studying the data collection procedures and how they differ. Another possibility is to match the data for the proper year to corresponding figures from the decennial Census to see which source most closely matches the Census at that point in time. A problem here is that other data sources frequently report employment collected by place of work while the Census reports employment by place of residence. If different time trends are observed for an industry, there are specific five year census publications which may give more guidance in choosing the correct data source (see below). Unfortunately, it is probable that no single data source is best for all industry employment calculations.

There are a number of specific data source presentation and collection methods that cause data sources to present data items differing in content. Comparability of data items from different data sources is affected by such methods.

Place of Residence - Place of Work

When comparing industry employment figures from different data sources in an effort to choose the best data source, certain problems arise. First, there is the place of residence versus place of work issue mentioned briefly above. Some data sources present industry employment by place of work. For such data sources the basic reporting unit of employment is the firm or the employer. Other data sources, such as the various government Census reports, present data by place of residence. For those data the basic reporting unit is the individual employee's household or residence. Some individuals live in one county and work in another or even live in one state and work in

another. As a result, industry employment figures from place of residence data will not necessarily correspond closely to the equivalent figures from place of employment data.

Seasonal Adjustment

Another factor to note is that most data sources present seasonally unadjusted data. In a cycle of spring to winter, if monthly data is presented, some industries will exhibit a seasonal influence on employment. For example, agriculture will have high employment in the late spring, summer, and early fall months, and low employment the rest of the year. If a data source presents employment for one specific month out of the year, and the specific industry has an employment level influenced heavily by the seasons, then the employment figure for that industry will not represent or even approximate the average yearly employment. As a result, the single month's employment for such an industry will not necessarily correspond closely with an average yearly employment from another data source or with employment from the same month from a data source adjusted to allow for seasonal influences.

Unit Disclosure

A further problem occurs with the application of the disclosure rule. The disclosure rule states that it is improper to publish employment data in any case where it would tend to reveal the operations of an individual firm or organization. It is not permissible in such a case to present industry employment, but it is permissible, although not required, to present the size of firm distribution, or the distribution of the firms in the industry classified by number of employees. The exact ruling of what criteria classify an employment figure as belonging to a category which may not be published is not clear. The various employment figures which may not be disclosed are usually signified by a "D". The presence of "D's" in a data source employment report for specific industries makes it very difficult to compare employment in these industries with corresponding industry employment from other data sources.

Employment Versus Work Force

A final issue is the difference between employment, the work force, and the labor force. The labor force consists of persons 16

or older who are members of the noninstitutional population and who are either employed or unemployed but actively seeking employment. Data to estimate the labor force is collected on a place of residence basis. The work force consists of the number of jobs held plus the number of unemployed persons. The work force is estimated with place of employment data and records of unemployment insurance claimants. The work force count of jobs involves multiple counting for a person holding more than one job, while the labor force counts such a person only once. This is the basis of the major difference between the estimates for the work force and the labor force. Employment is a different figure from both the labor force and work force estimates since the latter estimates both include figures for the number of unemployed persons. As a result, it is inaccurate to compare employment data with data on the work force and labor force.

Specific Data Sources

An important reference to employment data sources is entitled State Industry Employment Estimates.[1] (See Chart II.)[2] This paper lists 5 major sources of private wage and salary employment data:

1. CES (Current Employment Statistics), commonly referred to as "Workforce" data or "790" data.
2. ES-202 (Unemployment Insurance Records), also known as "UI" data.
3. County Business Patterns
4. Census of Manufactures
5. Census of Business

This paper is a very valuable source of information on industry projection methodology and specific data source areas of weakness.

Other specialized data sources are available for specified industry groupings. These include the Census of Mineral Industries, the Census of Construction Industries, the Census of Transportation, the Census of Retail Trade, the Census of Wholesale Trade, the Census of

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[1] State Industry Employment Estimates: a paper from the National-State Industry - Occupational Matrix Program, Bureau of Labor Statistics, St. Louis, Mo., November 14-16, 1972.

[2] Ibid, p. 3.

CHART II

Major Sources that States Could Use to
Develop Industry Employment Estimates

Class of worker or its adjustment	
1. Wage and salary workers	1. CES (Current Employment Statistics) ES-202 (Unemployment Insurance Records) County Business Patterns Census of Manufacturers Census of Business
2. Adjustments to wage and salary data A. Unpaid absences B. Multiple Jobholders	2. A. Factors supplied by BLS B. Factors supplied by BLS
3. Self-employed workers	3. Decennial Census Factors supplied by BLS
4. Unpaid family workers	4. Decennial Census Factors supplied by BLS
5. Government workers	5.
A. Federal government workers	A. UCFE (in ES-202 records) Data supplied by BLS for persons not covered by UCFE Factors supplied by BLS
B. State government workers	B. Public Employment (yearly census of government Decennial Census Factors supplied by BLS
C. Local government workers	C. Public Employment (yearly census) Factors supplied by BLS
*6. Special estimates	6.
A. Agricultural industry	A. Decennial Census Factor supplied by BLS
B. Forestry industry	B. Decennial Census Factor supplied by BLS
C. Fishery industry	C. Decennial Census Factor supplied by BLS
D. Private households	D. Decennial Census Factor supplied by BLS
7. Final adjustment	7. Factor supplied by BLS

* The estimates for these industries are derived separately from the method used for the other industries.

Source: State Industry Employment Estimates: a paper from the National-State Industry - Occupational Matrix Program, Bureau of Labor Statistics, St. Louis, Missouri, November 14 - 16, 1972, p. 3.

Selected Services, City Employment, Local Government Employment in Selected Metropolitan Areas and Large Counties, Public Employment, the Census of Governments, the Census of Agriculture, and Farm Labor Reports.

The Current Employment Statistics (CES) Program is a federal-state project operated jointly by State Employment Security Agencies, the Bureau of Labor Statistics, and the Manpower Administration in 44 states and the District of Columbia. For the remaining states, the program is conducted by a cooperative effort of State Departments of Employment Security and the Bureau of Labor Statistics. Data are based on information from payroll records from a representative sample of industrial, commercial, and government establishments. As a result, employment is reported by place of work. These records are voluntarily submitted to State Agencies. The coverage includes non-farm private wage and salary estimates of employment by industry. Excluded employment categories are proprietors, self-employed, domestic workers in private homes, and unpaid family workers. Other information available from CES, or Workforce, data include weekly earnings and average hours worked.

Employment and Earnings-States and Areas presents annual data from 1939 to the most current year compiled and published. It is prepared by the Bureau of Labor Statistics, U.S. Department of Labor. Industry employment for the nation and for state groups are available by industry divisions. Single state and Standard Metropolitan Statistical Areas (SMSA's) have industry employment up to the 3 digit level of detail, with detail levels varying from state to state and SMSA to SMSA.

Employment and Earnings is a monthly report published by the BLS giving national, state, and area statistics on employment, unemployment, hours, earnings, etc. Employment and Earnings, U.S. presents an annual series of historical national statistics for non-agricultural industries.[3]

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[3]All Employment and Earnings data are for sale from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402; from Government Printing Office bookstores; or from BLS Regional Offices in Boston, New York, Philadelphia, Atlanta, Chicago, Dallas, Kansas City and San Francisco.

Workforce data on a county level is available on a limited basis. Typically, county data presents employment by industry division in the form of monthly data, seasonally unadjusted. The length of time these observations have been published and the level of industrial detail may vary from state to state. Occasionally employment from several divisions will be combined in a single category for a given county in order to avoid disclosing the operations of individual establishments or business operations. This means that not all counties necessarily present the same industry employment categories. County data may usually be obtained from state Divisions of Employment Security.

Unemployment Insurance records, or UI, present private wage and salary employment by industry for each month. Data are available by county and by state. For Missouri, county data are available since 1967. This time span will vary in other states. The data is collected by place of employment and is not seasonally adjusted. In Missouri 2 digit detail is available. Some states have 3 digit detail.

Certain factors make the UI employment figures weak in certain industries. Industry employment data are particularly suspect in eleven SIC industries (see attached table).[4] This affects the three divisions of transportation; finance, insurance and real estate; and service. The services division is commonly underestimated because UI laws do not cover nonprofit organizations.

In Missouri, prior to 1972, employment of establishments hiring 1 - 3 employees was reported only on a voluntary basis since such establishments were not required to establish unemployment insurance coverage for their employees. Such problems will exist in other states for various years and sizes of establishments. In some states, specific employees may not be counted due to various UI rules regarding minimum period of time worked or wages earned by the employee. The UI data for agriculture are gross underestimates, at least for the state of Missouri.

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[4] State Industry Employment Estimates: a paper from the National-State Industry - Occupational Matrix Program, Bureau of Labor Statistics, St. Louis, Missouri, November 14 - 16, 1972, pp. 5 - 6.

TABLE I

Industries That Have Weak or Unavailable U. I. Data

SIC	Industry	Comments
40	Railroad transportation	No U.I. data is available.
421	Trucking, local and long distance	U.I. data must be supplemented with figures of employment of truck lines owned by railroads (approximately 3,000 nationally).
44	Water transportation	U.I. data available but weak due to lack of correspondence between place of employment and state of coverage.
474	Rental of railroad cars	U.I. data must be supplemented with figures of employment of companies renting railroad cars which are controlled directly or indirectly by railroad companies (nationally 5,000 approximately).
63	Insurance carriers	Very limited U.I. coverage since U.I. laws do not cover insurance carriers who are on a straight commission in 39 states.
673	Trusts	No U.I. coverage for SIC 6732 - educational, religious, and charitable trusts since these establishments are primarily nonprofit organizations.
80	Medical and other health services	No U.I. coverage for SIC 806 or 809 since most of these establishments in these SIC's are nonprofit which are not covered by U.I. laws.
82	Educational services	U.I. available but may not be reliable.
84	Museums, art galleries, botanical and zoological gardens	Very little U.I. coverage since most of the establishments in this SIC are nonprofit which are not covered by U.I. laws.
86	Nonprofit membership	Very little U.I. coverage since most of the establishments in this SIC are nonprofit which are not covered by U.I. laws.
892	Nonprofit educational scientific research agency	Very little U.I. coverage since most of the establishments in the SIC are nonprofit which are not covered by U.I. laws.

Source: State Industry Employment Estimates: a paper from the National-State Industry - Occupational Matrix Program, Bureau of Labor Statistics, St. Louis, Missouri, November 14 - 16, 1972, pp. 5-6.

County Business Patterns data is prepared by the Bureau of the Census with cooperation from the Social Security Administration.[5] The reports are a statistical derivation from employment and payroll information reported on Treasury Form 941, Schedule A., supplemented by a special survey of multiunit companies. Data represent the following types of employment covered by the Federal Insurance Contributions Act: all covered wage and salary employment of private nonfarm employers and of nonprofit organizations under mandatory coverage and employment of religious, charitable, educational, and other nonprofit organizations covered under the elective provisions of the FICA. State and local government employees, self-employed persons, farm workers, domestic service workers reported separately, and railroad (SIC 40) workers are not covered.

Data are available by state and by county annually from 1964. Employment figures are for the mid-March pay period by place of employment. Agriculture is not well covered.

Nominally data is available at the 4 digit level of detail, but on the county level this is largely negated by the Census disclosure rule. The rule, as noted above, forbids publication of employment figures when they would tend to reveal the operations of individual firms or organizations. The result is that in small counties, even divisional employment may be withheld from publication. When employment for an industry is withheld, the distribution of the employment size of the firms is printed. For example, SIC 20 has 3 firms of size 4 - 7 employees, and so on.

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[5]The official citation is U.S. Bureau of the Census, County Business Patterns, year desired, U.S. Government Printing Office, Washington, D.C., 20402. It is offered for sale by the Superintendent of Documents at the above address. The publication data is also available on computer tapes or punched cards. Detail at the 2 digit level is available for 1962 and 1964 - 1972 or the latest year prepared. Two and 3 digit detail is available from 1964 to the most current year prepared, while 2, 3, and 4 digit detail is available from 1965 to the most current year prepared. This data may be ordered from the Chief, Economic Statistics and Surveys Division, Bureau of the Census, Washington, D.C. 20233. (The Library of Congress card number referencing the publications is 49 - 45747.)

The various economic censuses are required by law under Title 13 of the United States Code. Congress authorized them to be taken at 5 year intervals for years ending in 2 or 7, beginning in 1967. Many of the censuses had been compiled for 5 year intervals for many years prior to 1967, however. In 1972, economic censuses were prepared for manufacturing, mining and quarrying, construction, retail trade, wholesale trade, selected service industries, transportation, and government units. All such censuses are subject to the disclosure rule cited above.[6]

The Census of Mineral Industries[7] breaks out data at both the state and county level. State data reveals employment and the number of establishments for each industry by 2 digit SIC code, with a partial supplement of 3 and 4 digit detail. County data gives the number of establishments by employment size class for each industry by 3 digit SIC code. The actual level of employment was not published by county as of 1967, although it may be published in more current volumes. State groups, such as New England, Middle Atlantic, and so on, present employment up to the 4 digit level of industry detail. Additional data items are included, such as selected expenses by SIC, capital expenditures by SIC, payroll by SIC, etc., for all geographic levels presented.

The Census of Construction Industries[8] offers state data giving the number of establishments and the number of employees by industry up to the 4 digit level of detail. As of 1967 no county data were presented. Other data includes the number of proprietors, total receipts, materials used, and so on, all by SIC code.

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[6]All are prepared by the U.S. Bureau of the Census, U.S. Government Printing Office, Washington, D.C., 20402. They are offered for sale by the Superintendent of Documents at the above address. Most of them are also available from any Department of Commerce field office. When placing an order, the year of data desired should be specified, as well as the name of the state or states that are of interest and the specific economic census. The order should specify whether area statistics or just nationwide statistics are desired. In addition, most large libraries or university libraries should have access to copies of these volumes.

[7]The Library of Congress card number is A66 - 7829.

[8]The Library of Congress card number is 79 - 609528.

The Census of Transportation[9] apparently offers no employment figures at all. It does offer travel figures, truck inventory and use data, and commodity transportation surveys.

The Census of Retail Trade offers the number of paid employees for the week including March 12 for the state, Standard Metropolitan Statistical Areas, counties with 500 establishments or more, cities with 500 establishments or more, and for all counties, and cities of 2500 inhabitants or more. The table of all counties and cities of 2500 people or more offers industry division detail only. The other geographic tables offer 2 digit detail with a partial break of up to 4 digit detail. Other included data are payrolls, the number of proprietorships, etc.

The Census of Wholesale Trade gives the number of paid employees for the week including March 12 by industry. State data has 4 digit detail. SMSA data has up to 4 digit detail, with the level of detail varying from SMSA to SMSA. Counties with 200 wholesale establishments or more show 3 digit detail. All counties and cities of 5000 inhabitants or more have divisional detail only. Among other data items are included inventories, payroll, sales, etc.

The Census of Selected Services covers SIC codes 701 and 703, 72, 73, 75, 76, 78, and 79, 8072, 81, and 891. The number of establishments, receipts, payroll, and paid employees for the week including March 12 are published. For the state, SMSA's, counties with 300 establishments or more, and cities with 300 establishments or more, data is available by industry up to the 4 digit level of detail. For all counties and cities of 2500 inhabitants or more, the data are listed only for all selected services combined.[10]

The Census of Manufactures,[11] although it is published at 5 year

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[9]The Library of Congress card number is 76 - 607509.

[10]Prior to 1972, specifically in 1967, the censuses of wholesale trade, retail trade, and selected services were included as volumes of the Census of Business. The Library of Congress card number is 72-608032. Orders for these censuses in the early years of publication should refer to the Census of Business, requesting the volume giving the industry sector desired.

[11]The Library of Congress card number is 74 - 609524.

intervals, offers both annual data and 5 year interval data. Total manufacturing employment by state and SMSA is listed for all years covered between 5 year publications and often for a few years further back. At 5 year intervals, the number of establishments and employment for manufacturing industries up to the 4 digit level of detail is listed for states and SMSA's. By county, employment is given by 2 digit SIC, along with the distribution of establishments by employment and size class.

The Census of Governments[12] includes a wealth of information on employment by industry and by function along with various payroll statistics. Federal, state, and local government employment for October is presented by level of government, by regions of states, and by state. Full-time employment, part-time employment, and full-time equivalent employment is published. Local government employment and payrolls are given for individual counties, again for October of the relevant year.

City Employment[13] is an annual publication also issued by the Bureau of the Census along with the U.S. Department of Commerce. It includes the number of local government employees and payrolls for cities and selected urban towns and townships having 50,000 inhabitants or more. The data are reported for October of each year. The figures also are presented by state. Full-time equivalent employment for the various geographical units is presented by various selected municipal functions, such as police protection, water supply, etc.

Another annual publication is Local Government Employment in Selected Metropolitan Areas and Large Counties.[14] This publication lists local government employment and payrolls in the 72 largest SMSA's for October by the SMSA component counties and by function. Other selected local government figures are also presented.

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[12]The Library of Congress card number is A68 - 7201.

[13]Can be ordered from the Bureau of the Census, Washington, D.C., 20233.

[14]Issued by the U.S. Bureau of the Census, U.S. Government Printing Office, Washington, D.C., 20402. It is offered for sale by the Superintendent of Documents at this address. (The Library of Congress card number is 74 - 611354.

Public Employment[15] is a final source of government employment. It is an annual publication. Data figures are for October of each year. The number of public employees is reported by level of government and by state. This report includes federal employment within each state. Employment and payrolls of state and local governments are presented by type of government and by state. Full-time equivalent employment of state and local governments is published by function and by state. Many other government statistics are available in this publication. All data figures are unavailable at the county or SMSA level.

Of the previous sources discussed, City Employment, Local Government Employment in Selected Metropolitan Areas and Large Counties, and Public Employment are all annual publications based on a survey of government employment in October. The survey coverage for each state applies to the state government and a random sample of local governments selected form the total number of local governments specified in the most recent Census of Governments. Public Employment presents employment only to the state level, while Local Government Employment in Selected Metropolitan Areas and Large Counties extends data presentation to the level of counties composing SMSA's. City Employment offers further data for municipalities and major townships of a specified population or more.

Farm Labor Report[16] is a good source for agricultural data at the state level. It is prepared by the United States Department of Agriculture. The data presented include farm employment by state. Farm employment represents the number of family and hired labor working during the survey week. Family labor includes farm operators working on farms one hour or more plus other family members working 15 hours or more without receiving cash wages. Hired workers include all persons working one hour or more for cash wages.

The Farm Labor Report was issued monthly and presented monthly farm

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[15]Issued by the U.S. Bureau of the Census and offered for sale by the Superintendent of Documents, Government Printing Office, Washington, D.C., 20402. (The Library of Congress card number is 40 - 26613.

[16]United States Department of Agriculture, Statistical Reporting Service, Crop Reporting Board, Washington, D.C., 20250.

employment through December of 1974. The monthly farm employment covered persons employed during the last full calendar week ending at least one day before the end of the month. Starting in 1975, the Farm Labor Report became a quarterly issue, presenting quarterly estimates of farm employment, based on the Quarterly Agricultural Labor Survey. It is published in February, May, August, and November. It includes adjustment factors for use in interpolating monthly data from the quarterly estimates. The quarterly estimates are based on two random samples coordinated together. The first is a sample of employers of agricultural labor, excluding agricultural service firms. The second is a sample from a complete listing of small partitioned units of land across the state.

The Census of Agriculture[17] was authorized under Title 13 of the U.S. Code. Section 142 (a) provides for the census to be taken in 1959 and each fifth year thereafter. Section 191 provides that the census will include each state. For years prior to 1959, the Census of Agriculture was completed for various years ending in five and zero.

For both the state and county levels, farm employment is listed for farms with $2500 sales and over annually. The number of hired farm workers are listed which worked 150 days or more out of the year. Also listed are the number who worked less than 150 days of the year. The number of hired farm employees are not available for farms with sales of less than $2500 per year, but the number of such farms using hired farm labor and the amount of money expended on this labor are presented. This employment detail is that found in the latest published Census of Agriculture in 1969. Previous Censuses have differing formats for presenting farm employment data collected.

The entire Census of Agriculture is subject to the Census disclosure rule discussed before. It is necessary to study specific state volumes for information on coverage of the Census, sampling procedures, and

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[17] U.S. Department of Commerce, Social and Economic Statistics Administration. Suggested Citation: U.S. Bureau of the Census, Census of Agriculture, Year, Volume 1, Area Report, State, Section number, Summary Data or County Data.

comparability of data with previous years of data collected.

Summary

In closing, it is important to note that wage data, payroll data, and other valuable information frequently accompany employment data for most of the data sources listed above. Local libraries are often able to obtain copies of the publications if requested to do so.

There are often differences in the data base from state to state for the same source; e.g., in the number of years the data have been reported and published, in the industry detail level offered, and in the quality of the data. Another problem arises when there are changes in the SIC code system. SIC code changes occur when there are revisions of the SIC Manual. When this happens, the definitions of specific kinds of business, or kind-of-business classifications, change. The most recent change occurred in 1972, with the 1972 SIC Manual listing various code changes from the code system in the previous 1967 SIC Manual. The 1967 SIC Manual had listed changes made from the coding for the 1957 SIC Manual. Some data sources presenting information by SIC detail all recent changes in the code, and some even convert their tables to both coding systems whenever possible. It is important to be aware of SIC code changes when developing time trends or comparing data items from different points in time.

Finally, this paper attempts a listing only of major data sources whose coverage spans the entire United States. The result offers information on data sources that will be available to any investigator whose geographical scope is defined as an area within the United States. Other data sources than those listed above will exist that are specific to certain states or areas. Such data sources may be invaluable to the investigator who deals with a geographic area which they cover. Investigators should attempt to find localized data sources specific to their area of interest to supplement the major data sources covered here.

THE NEED AND POTENTIAL FOR ANALYTICALLY BASED OCCUPATIONAL CLASSIFICATION

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Prepared for a National Conference on Occupational Employment Projections for Program Planning Purposes: Issues and Examples.

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Since the writing of the MOTIS volume Occupational Classification Systems and Vocational Education Planning,[1] research in the area has continued through The Human Resources Research Program, University of Missouri - Columbia through the auspices of a Part C grant from The Bureau of Occupational and Adult Education, U.S. Office of Education; and under grants from the Missouri State Department of Elementary and Secondary Education.

A recently completed study assessed the degree to which the functioning of occupational labor markets is consistent with the predictions of the competitive hypothesis of economic theory.[2] In the following pages, which constitute the final chapter of this study the findings are reported and an interpretation of these findings provides a basis for arguing that occupational classification systems should receive considerable attention from manpower and educational planners. Concepts and research avenues which could aid the development of improved occupational classification systems are proposed.

Interpretation of Results and Suggestions for Future Research

This interprets the general results of our tests of the competitive hypothesis. It offers some suggestions for future research and offers suggestions to manpower and educational planners and policy makers. A unifying concept for future efforts in occupational classification is introduced.

Interpretation of Results

This study generally does not find significant correlations for the data configurations tested. For each data configuration tested, the null hypothesis is that there will be no correlation between relative occupational employment changes and relative occupational income changes. A finding of significant correlation would be consistent with the short run competitive hypothesis of labor market behavior and inconsistent with the null hypothesis.

If the statistical findings of this study are taken to truly represent the state of the occupational markets during the 1960s, and if it is thought that such a state currently prevails as well, there are important implications for analysts who produce projections for use in educational and manpower planning. With no apparent connection between relative wage

changes and relative employment changes for occupations in general, it becomes important to perform intensive analysis of individual occupations to ascertain their unique responses to technological and social change. The general predictions of the competitive hypothesis are not available to the educational planner if the lack of correlations truly reflects the operation of labor markets. The short run prediction of the competitive hypothesis is that there will be a positive correlation between relative changes in occupational income and employment. We are asking here whether analysts should generally presume such a relationship. Our analysis does not indicate that they should. Analysts working with methodologies of educational and manpower planning which omit wages as explicit factors might take some solace from this fact, but as succeeding comments indicate, they should not see it as a strong indication that their methodologies are "correct".

Alternative general formulations are not sufficiently developed to provide a general planning framework. In regards to dual and radical investigations of the labor markets, it is important to realize that they currently suggest intensive analysis of individual cases, segmentations and the like. They do not offer acceptable general predictions. Cain has recently concluded that his "judgment of the D-R (dual-radical) challenge is that it does not begin to offer a theory of the labor market that can replace neoclassical theory."[3] This is certainly true as regards educational planning. If the results of this study and Cain are to be believed there is no comprehensive theory of labor markets from which educational planners can confidently draw guidance.

Current defense of the competitive hypothesis as it applies to manpower and educational planning must apparently be made on the same grounds used by its attackers. As Piore has said in defense of the dual-radical paradigm:

> ...I, for one, am not about to dismiss any of the constructs simply because econometric evidence fails to support it. I do not want to ignore the econometric evidence; but I am much more likely to infer from that evidence that I got the structure wrong or that they (the econometricians) got me wrong than that the labor market structures I have talked about have no reality and do not require an explanation. [4]

The methodology of this study is conservative. In the spirit of Piore's assertion, this indicates good reason for believing that

competitive labor market behavior may be quite important. Statistical conservatism results in an increased probability of making a Type II error. A Type II error occurs when a null hypothesis is not rejected when it is actually false. A Type II error in this study would occur if the lack of correlation resulted from the conservative nature of the methodology and not from actual competitive or non-competitive behavior of the economy.

The Type II error concept is used here to encompass all sources of conservatism in the study and not just the Kendall's Rank Order Correlation statistic employed. The basic sources of conservatism in this study are (1) the occupational classification system employed (2) the types of relative changes measured (3) the use of nonparametric statistics (4) the comparison of two points in time (5) the use of data generated by the Census questionnaire. These sources have been discussed in some detail during this study and the reasons why they exert conservative influences have been explained. The lack of a more suitable occupational classification system forced the use of one which forced the acceptance of conservative influences (2) - (5).

The conservatism of this study makes an asymmetrical interpretation of its results appropriate. Due to our conservative methodology, we could have had considerable confidence in significant correlations had they been found. We cannot have a symmetrically high level of confidence that the lack of discovered correlations truly represents the nature of the economy. Statistically, a low probability of making a Type I error--of rejecting the null hypothesis when it is true--is always accompanied by a high probability of making a Type II error. Consequently, in this study, our general finding of no correlation is more likely to be in error than a finding of significant correlation would have been.

Future Research Suggestions

An agenda for future research should emphasize efforts to reduce the conservative influences on studies such as this one. A main unifying theme of future research must be the construction of approaches which reduce within-occupational category variance from various sources relative to between-category variance. This is necessary if we are to ever discover the values which result from being within an occupational category. Such discovery could in turn allow meaningful measures of

differences between categories (such as measures of changes in incomes and employment).

In order to reduce within-category variance for certain measures, it may be necessary to increase it along other parameters. Such trade-offs are discussed in the Appendix which develops more fully the desirable characteristics of an occupational classification system which were presented in Chapter III. To reduce within-category variance in a helpful way it is necessary to determine the relative importance of various occupational characteristics. In other words, it is necessary to decide what attributes best distinguish among occupations for the purposes for which occupational categories are to be used. Scoville has had some success organizing jobs according to skill content.[5] Scoville and others have emphasized that an occupational classification cannot have universal applicability because of trade-offs in variance reduction along various parameters.[6]

There are ways to reduce the conservativeness of future studies which do not require a revision or replacement of the Census occupational classification system:

(1) The distributional characteristics of various occupational categories could be studied. This might result in a set of categories which could confidently be analyzed parametrically,

(2) The income distribution of an occupational category may approach normality as may the distribution of income changes among all categories. The application of robustness arguments to allow the use of parametrics should be pursued.

(3) The type of relative changes used in this study are conservative and thus obscure some of the differences between within- and between-category variances. The use of parametrics might allow different types of relative changes to be calculated and meaningfully analyzed.

(4) Comparison of a category's income distribution variance could serve as an indicator of whether the same work activities were included in the category in 1960 and 1970. Divergent variances might indicate changes in jobs or skill content of jobs included in an occupational category.

(5) Analysis of individual occupational categories to determine the likely speed of supply adjustments could result in a set of categories for which 10 years is more certainly a short run period. Testing this set of categories would result in a less conservative test because of a decreased likelihood that competitive forces had worked themselves out during the time period. Similarly, more information regarding demand and

supply elasticities would be helpful in designing less conservative tests using the data files already created by this study. Using categories with elasticity values known to be similar would narrow the range of plausible explanations of the results of an analysis.

The research suggested above would add considerably to our useable knowledge. It seems likely, however, that an occupational classification system better suited to labor market analysis will be necessary if we are to come to trustworthy conclusions about the functioning of occupational labor markets. The next section addresses this need.

Suggestions to Manpower and Educational Planning Policy Makers and Practitioners

This study parallels many others in that nothing of immediate practical relevance was definitely discovered about the economic behavior of occupational labor markets. For instance, the findings of this study are inconsistent with those of Freeman and Buechner. However, those two studies, both of which parametrically explore the 1950-1960 decade using Census data, are also in disagreement with one another. Freeman found that "In general, industries also tended to reduce employment of occupations with rising wages..."[7] while Buechner found that "...most industries substitute rising wage occupations for falling wage occupations."[8] Studies in this area which employ currently available data sources are apparently unlikely to yield strong or surprising results.[9] Better data sources must be developed if vocational training and manpower programs are to be of lasting success. Efforts such as the Comprehensive Employment and Training Act (CETA) call strongly for more, and especially more meaningfully defined, information regarding various occupations.

Perhaps the theoretical rallying point for the organization of future data sources and studies of current or future data should be the concept of entropy. Entropy is a concept which can help us to choose appropriate parameters along which to delineate occupational categories from one another. Entropy is a central concept of information theory. It is well suited to analyzing current and proposed occupational information systems. As Theil has stated: "Many problems in the social and administrative sciences concern the division of some given total into a number of components. The question may then arise: How large is the degree of 'dividedness?' The entropy provides an answer to this question."[10]

While the theoretical definition of entropy takes mathematical form its general nature is conveyed here:

> Given that we know that exactly one of a number of events is bound to occur, and also the probabilities of occurrence, how much information will we receive when a message arrives stating what actually happened? This amount of information is a random variable and the entropy is its expectation. Also, ...the entropy may be regarded as a measure of uncertainty regarding the outcome, the argument being that uncertainty prior to the arrival of the message and expected information provided by the message are two sides of the same coin. [11]

Entropy is a concept in the field of decomposition mathematics. It can be conceptualized in at least two ways:

(1) as a measure of the expected information content of a message

(2) as a measure of uncertainty

Entropy can tell us "how much aggregation (of jobs into occupations) can be performed subject to a given maximum total information loss."[12] As regards occupational classification and research in occupational labor markets, entropy can provide a unifying standard by which to measure the impacts of classifying a job into one occupational category or another. As a measure of uncertainty and expected information content, entropy can act as an indicator of the amount of "unusualness" that a particular job has with respect to other jobs in an occupational category. It can thereby indicate when a job is inappropriately classified. Entropy can similarly indicate the degree of dividedness between one group of jobs (occupation) and another according to various parameters. The parameters which are important for policy purposes can be adhered to systematically when an occupational classification system is constructed with the aid of the entropy concept. The relative importance of the parameters can be accounted for using the concept. Trade-offs between desirable features of a system can be consistently analyzed and the optimal arrangements selected. Currently existing systems can be analyzed with the entropy concept to determine where they do and do not delineate among occupations in accordance with the desired characteristics or parameters.

The entropy concept can help unify efforts to document and analyze occupational labor markets. It cannot replace hard decisions concerning what information persons working in this area desire to have collected, but it can indicate the relative usefulness of specific information for various purposes and it can indicate where trade-offs are necessary. A

particular classification system cannot do all things; entropy can indicate what its limitations are in various respects. If a system is multipurpose it is likely to achieve each of its purposes less accurately than systems designed specifically for each of those purposes. Entropy can indicate the loss of accuracy for one purpose that results from changing the degree to which a system suits another purpose. At some point, which purposes are paramount must become a policy judgment. This judgment should be made explicitly. Existing systems generally do not document explicit judgments of this type and are therefore difficult and misleading to use for purposes of analysis.

The entropy approach seems to generate several avenues for policy relevant future research. The conservatism of studies such as this one could be appreciably reduced through such efforts. Within-category variance would necessarily lessen along priority parameters if entropy approaches were taken to the grouping of jobs into occupations. What continues to be crucial is the realization that classification systems that grow without unified direction will continue to yield mediocre results; they have too many purposes to which they are only somewhat committed or suited. Perhaps the initial contribution of an entropy approach will be to indicate the degree of suitability of various existing and proposed information and classification systems for various purposes.

Conclusions

This study provides another example of the need for better occupational classification systems. If labor market information is to improve in scope and usefulness, classification systems which explicitly recognize the trade-offs inherent in the construction of multipurpose occupational categories must be devised.

Occupational classification underlies a great variety of manpower and educational program efforts. Existing classification systems may impede the success of these programs because they are unsuited to the analyses which are called for by the programs. Considering the costs that the use of inappropriate systems may impose, considerable support of research on aggregation procedures, entropy applications and occupational classification systems seems warranted.

FOOTNOTES

[1]Alan Roskam and Michael Podgursky, Occupational Classification Systems and Vocational Education Planning, Missouri Occupational Training Information System (Jefferson City: State Department of Education, 1975).

[2]Alan Roskam, "Labor Market Analysis and Educational Planning: Tests of the Competitive Hypothesis" (Ph.D. dissertation, University of Missouri-Columbia, 1975).

[3]Glen G. Cain, "The Challenge of Dual and Radical Theories of the Labor Market to Orthodox Theory," (University of Wisconsin, 31 October 1974), p. 78. (Mimeographed)

[4]Michael J. Piore, p. 684 in discussion following Michael L. Wachter, "Primary and Secondary Labor Markets: A Critique of the Dual Approach," in Brookings Papers on Economic Activity 3 (1974).

[5]James Scoville, The Job Content of the U.S. Economy 1940-1970 (New York: McGraw-Hill Book Company, 1969).

[6]Glen Cain, W. Lee Hansen, Burton Weisbrod, "Occupational Classification: An Economic Approach," Monthly Labor Review 90 (February 1967): 48-52.

[7]R. B. Freeman, "Manpower Requirements Analysis and the Skill Composition of the U.S. Labor Force," Discussion Paper Number 355, Harvard Institute of Economic Research, April, 1974.

[8]William R. Buechner, "Technological Change and the Occupational Composition of the American Labor Force, 1950-1960" (Ph.D. thesis, Harvard University, June, 1972).

[9]See the Roskam-Podgursky MOTIS volume for a discussion of data source characteristics.

[10]Henri Theil, Statistical Decomposition Analysis: With Applications in the Social and Administrative Sciences, Vol. 14: Studies in Mathematical and Managerial Economics (Amsterdam: North-Holland Publishing Company, 1972), p. 1.

[11]Theil, p. 13.

[12]Theil, p. 39.